Engin.
Library

-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

OCT 26 1933

CONTENTS IND.

# THE IRON AGE

DUCTION -:- MANAGEMENT

OCTOBER 26, 1933

PROCESSES -:- NEWS

GRANITE CITY STEEL CO.

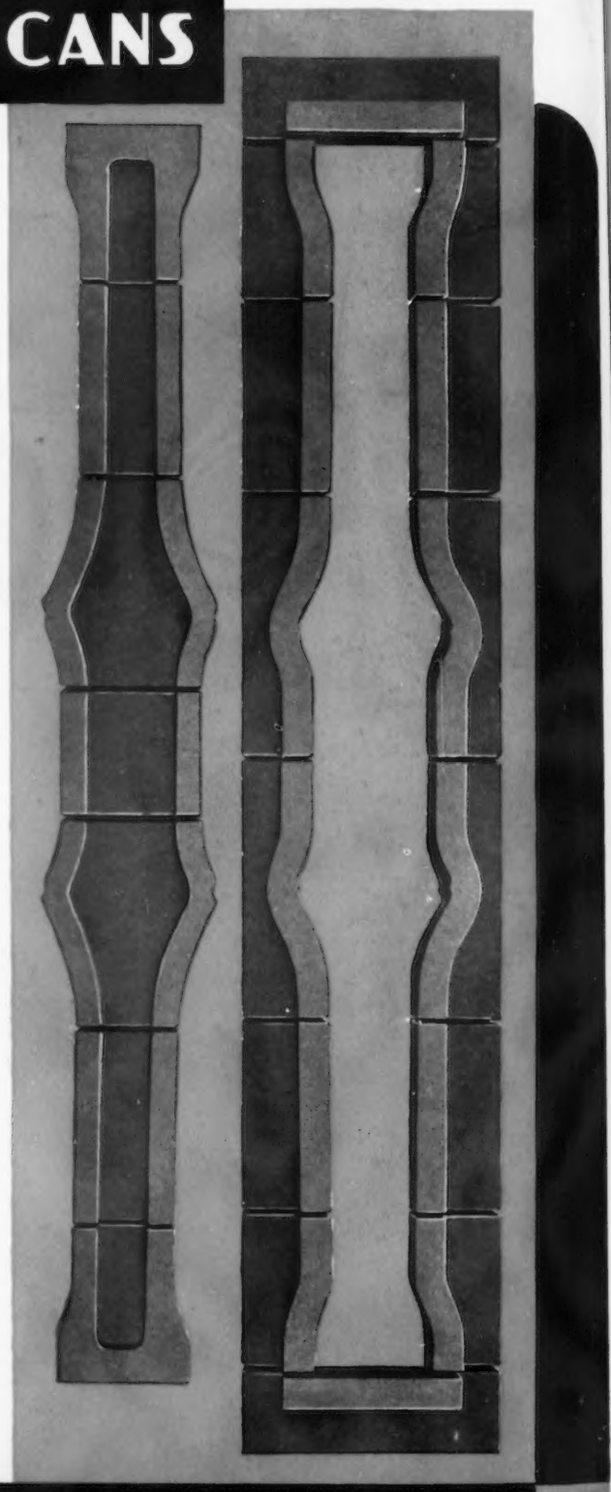
GRANITE
COPPER CITY BEARING
STEEL

NRA

GRANITE CITY ILL.

# AUTOMOBILES . . . CIGARS . . TIN CANS

Rear axle housing sectional blanking die



THESE are only a few of the many and widely varied industries which standardize on Krokoloy—our leading chrome Cobalt alloy air-hardening tool steel cast to shape. This superior alloy is ideal for maximum runs and toughest jobs. It is an economical alloy because its use eliminates excess materials to a degree which often

Tin can cutting and forming rings

brings Krokoloy castings below the cost of ordinary steel tools. Write for our Krokoloy booklet. You should have this literature in your file for ready reference.

Cigar binder cutters

Whatever you need in tool steels cast to shape, you will find the alloy you require included in our complete line. Our line includes Martin Steel and Castaloy, both economical tool steels cast to shape and hardened in still air, and Carbomang, an oil-hardened tool steel cast to shape. Let our sales engineers work with you without obligation on your die designing and machine tool problems.

KROKOLOY

## DETROIT ALLOY STEEL COMPANY

Foot of Iron Street — Detroit, Michigan

*Eastern District Sales Manager:* T. Andersen
135 Post Ave., Lyndhurst, New Jersey

*Central District Sales Manager:* William C. Eakin
707 Berkshire Ave., Pittsburgh, Pennsylvania

*THE IRON AGE*, published every Thursday by the *IRON AGE PUBLISHING CO.* Publication Office: N. W. Cor. Chestnut & 56th Sts., Philadelphia, Pa. Executive Offices: 239 W. 39th St., New York, N. Y., U. S. A. Entered as second class matter at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 132, No. 17.

▲▲ THE IRON AGE ▲▲ October 26, 1933 ▲▲

J. H. VAN DEVENTER, *Editor*
F. J. WINTERS
G. L. LACHER, *Managing Editor*
G. EHRNSTROM, JR., *Pittsburgh*
W. W. MACON, *Consulting Editor*
T. H. GERKEN, *News Editor*
BURNHAM FINNEY, *Detroit*
R. E. MILLER, *Machinery Editor*
GERARD FRAZAR, *Boston*
F. L. PRENTISS, *Cleveland*
R. A. FISKE, *Chicago*
A. I. FINDLEY, *Editor Emeritus*
L. W. MOFFETT, *Washington*
R. G. McINTOSH, *Cincinnati*

# CONTENTS

A Divided House Cannot Stand ..... 11
Stainless Steel in Ornamental Work ..... 12
Attractive Finish Helps Metal Products Sales ..... 16
Titanium and Columbium in High-Chromium Steels ..... 20
High Resistance to Fatigue at High Hardness ..... 23
Hardening Cast Iron by Heat Treatment ..... 24
Exhibits from Century of Progress ..... 28
Gear Makers Review Technical Progress ..... 30
Iron and Steel Electrical Engineers Meet ..... 34
New Equipment ..... 36
News ..... 38
Personals and Obituaries ..... 41
Automotive Industry ..... 42
Washington News ..... 44
Markets ..... 51
Construction and Equipment Buying ..... 68
Products Advertised ..... 88
Index to Advertisers ..... 106

▲▲▲

THE IRON AGE PUBLISHING COMPANY
F. J. FRANK, *President* G. H. GRIFFITHS, *Secretary* C. S. BAUR, *General Advertising Manager*
*PUBLICATION OFFICE: N. W. Corner Chestnut and 56th Sts., Philadelphia, Pa.*
*EXECUTIVE OFFICES: 239 West 39th St., New York, N. Y., U. S. A.*

Member, Audit Bureau of Circulations
Member, Associated Business Papers

Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50, including duty; Foreign, $12.00 a year. Single Copy 25 Cents

Cable Address, "Ironage, N. Y."

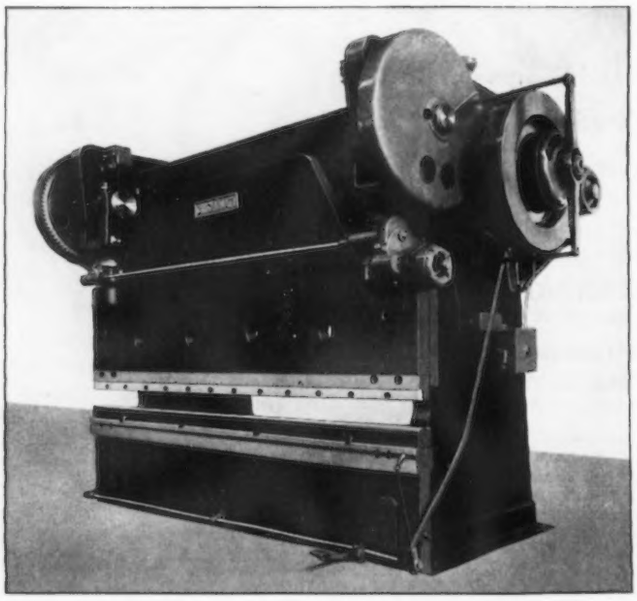
*ADVERTISING STAFF*
Emerson Findley, 311 Union Bldg., Cleveland
B. L. Herman, 675 Delaware Ave., Buffalo, N. Y.
H. K. Hottenstein, 802 Otis Bldg., Chicago
Peirce Lewis, 7338 Woodward Ave., Detroit
Charles Lundberg, 45 Kent Rd., Upper Darby, Del. Co., Pa.
C. H. Ober, 239 West 39th St., New York
W. B. Robinson, 428 Park Bldg., Pittsburgh
W. C. Sweetser, 239 West 39th St., New York
D. C. Warren, P. O. Box 81, Hartford, Conn.

SEVENTY-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

# Strength Light-weight Economy

say:

## "Use PLATES for Machinery Housings"



In Plates the designer of heavy machinery has available a homogeneous material whose strength is known within very close limits, enabling him to provide the proper factor of safety with a minimum of weight.

Manufacturing costs are lower when housings are made from Steel Plates. The low cost-per-pound and high tensile strength of Plates, together with the facility with which they can be fabricated, make possible the design of machines that are lighter, better able to stand rough usage, and more economical to build. . . . Bethlehem Steel Company, *General Offices*, Bethlehem, Pa.

BETHLEHEM STEEL

## BETHLEHEM STEEL PLATES

▲▲▲ THE IRON AGE ▲▲▲

OCTOBER 26, 1933

ESTABLISHED 1855

Vol. 132, No. 17

# A Divided House Cannot Stand

▼ ▼ ▼

THE IRON AGE has been and is, a strong advocate of the essential principles of the President's Recovery Plan.

The criticisms that have been made in these columns have been for the purpose of helping the plan to succeed; not for the purpose of hindering it. They have been confined almost entirely to the application and interpretation of the highly controversial labor clause in Section 7, regarding which honest men may differ in opinion.

THE IRON AGE has no quarrel with collective bargaining. It is in favor of the payment of the highest possible wage rates and the shortest practical work week. And so too is the Industry that THE IRON AGE represents.

In a sincere spirit of helpfulness to the NRA, we offer the following observations based on intimate contact with America's principal industry:

THE President's plan, at its inception, met with the united support of employers in the metal-working industry. Today, our sources of information lead us to believe that many of these same employers have lost faith in it.

Regardless of the support of organized labor, which has always, politically, been a fair weather friend, a house divided against itself cannot stand. Any plan or policy which, on a broad scale, puts employers and employees at swords points is doomed to failure.

But aside from both employers and employees, there is another group which is the key to the recovery movement. This group comprises the American investors, large and small, and provides the capital for industry from its savings.

UNCLE SAM'S enormous pocketbook is not large enough to furnish the financial needs of industry. The private investor must do his part.

Private investors invest in *management*, not in physical assets such as bricks and machinery. They will *not* invest in management that is hamstrung through enforced subservience to labor union dictation. They will invest in initiative, ability and efficiency; not in the activities of walking delegates, in union seniority rules or in the check-off.

A vociferous minority of union officials has apparently convinced some of our people in power that the way to salvation lies in complete unionization of industry under the rule of the "old guard."

It will be a difficult matter to convince investors, employers or the large majority of independent workers that National interests can be promoted by any such course.

Unless and until such impressions are corrected by official and definite pronouncements, we predict rough going for recovery.

CRAFTSMANSHIP is not confined to the working of precious metals. Artistic expression through the medium of steel goes back to the days of Damascus.

# Stainless Steel In Ornamental Iron Work

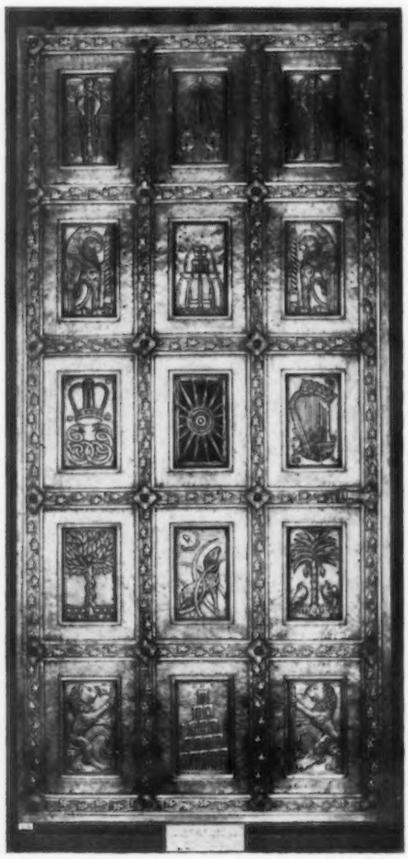
By F. L. PRENTISS
Cleveland Editor, The Iron Age

THE popularity of modernistic decorative art in the natural colors of the white or silvery metals has created a demand for ornamental metal work in designs that are in striking contrast with the antique pieces of ornamental wrought iron made with forge and anvil. Neither does this modernistic work with its bright, colorful effects bear much resemblance to the somber but artistic modern ornamental wrought iron work that retains its popularity for use in doors, balconies, stair railings and other adornments for buildings as well as for other decorative and utilitarian purposes. The more recently developed plating processes have also played their part in producing a wide variety of bright ornamental decorative metal work.

New ferrous and non-ferrous metals have furnished a wide variety of materials that are supplementing the use of wrought iron for decorative metal work and new designs have resulted from the adaptability of modern mechanical fabricating processes for producing work in these modern designs.

For centuries ornamental iron was forged on the anvil with the hammer. Then came the oxy-acetylene process of metal fusing and a later change in the fabricating process is the use of spot and arc welding. While the hammer in the hands of a skilled artisan is still largely depended on, mechanization has been applied to the industry.

Stainless steel is the latest metal to be taken up by the ornamental iron manufacturer for use in his art, and considerable progress has been made in the use of this steel in its field, although its adaptation for ornamental work is still in the development stage. Advantages of the use of the stainless material include the opportunity it offers for providing work in bright colors and its non-corrosive qualities. Color combinations that are very attractive are effected by the blending of stainless steel with brass, the bronzes and aluminum.



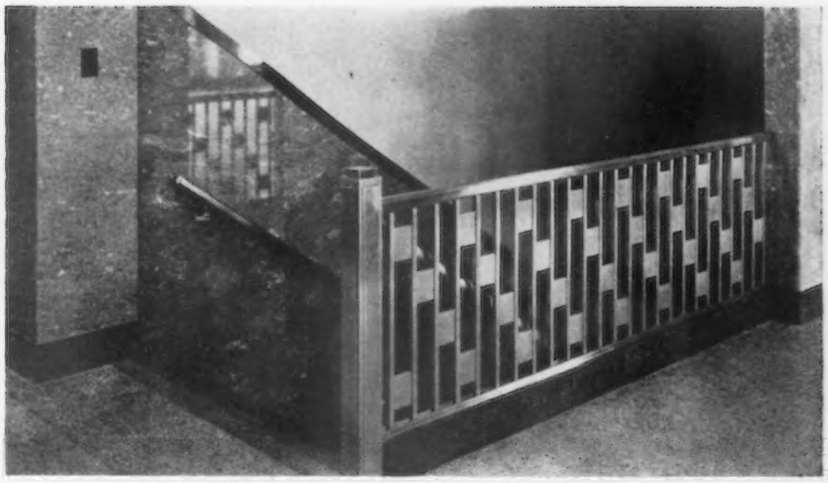
Mausoleum door built entirely of KA-2 Nirosta steel, hand hammered, antiqued finish.

The main objection to the use of stainless steel for ornamental metal work is the increased cost of the material and somewhat greater labor costs. However, it is contended that the additional cost of the steel should not be a serious factor when it is but a small portion of the total cost, and there is assurance that the beauty of the finished product will not be marred by corrosion.

The Rose Iron Works, Inc., Cleveland, has pioneered in the use of stainless steel in making ornamental metal work and has carried on development work in other directions in the ornamental iron industry. This article, to a large extent, is confined to a description of methods developed and now used in the Rose plant in the manufacture of ornamental metal work in stainless steel.

The founder and head of the Rose Iron Works is Martin Rose, a native of Hungary, who for years worked in some of the finest ornamental iron shops in both Hungary and Austria. After being employed for a time in the shop in which he served his apprenticeship he secured employment in the Gyula Jungfer, a famous royal shop in Budapest. While there he did ornamental iron work on many of the finest castles and hotels, the Hungarian Parliament Building and the

LITTLE has as yet been published on the subject of the use of stainless steel in the field of ornamental iron work. We know that our readers will enjoy and profit by this article which describes the artistic use of stainless by a company of high reputation in the ornamental iron field.



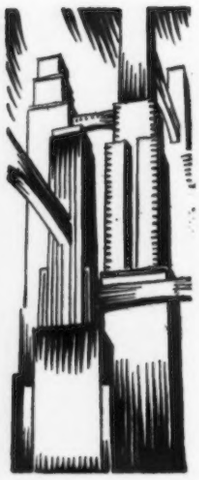
Stair railing of Nevastain RA in the Pere Marquette Building, Minneapolis.

palace of Emperor Francis Josef in Budapest. He spent five years in Vienna, where he worked in some of the finest ornamental iron shops and attended the royal art school. Later he operated a shop of his own in Budapest for a number of years until 1903, when he came to America. Two sons are now associated with him in the business.

Stainless steel may be forged into many decorative designs, although it has limitations in this respect because of its toughness and the technique of the forging method is somewhat different from that used in forging wrought iron. Even ordinary wrought iron is not found satisfactory in the Rose plant when intricate designs are to be made, and Swedish iron is used in its place. If two pieces are to be joined this is done by the use of the acetylene torch or by spot or arc welding, as the stainless steel, it is stated, cannot be welded on an anvil like wrought iron. While the oxy-acetylene process in welding wrought iron has long been used, spot and arc welding are comparatively new practices in this field, either in welding wrought iron or stainless steel. All forming is done hot, except in light gage material.

Rustless steel may be used for making most decorative pieces that are produced in wrought iron, but because of its hardness and toughness it takes longer to form it in shape under a hammer and to perform such operations as are done mechanically. In selecting material for ornamental work the practice in the Rose plant is to use a metal that is best suited for the piece. When a bright silvery white color is desired stainless steel

Fireplace set of stainless screen, andirons, log basket and tools.



Detail of spandril made of Nevastain RA in the Pere Marquette Building, Minneapolis.

may be the material chosen, but it is not used when the piece is to be in rustic colors or antique design. The stainless material is found adaptable for stair railings, doors, grills, lock sets and other builders' hardware, scroll work, store fronts, fireplace sets and other ornamental pieces for houses and various other ornamental work both in bright colors and more subdued tones.

Rustless steel has certain limitations in this field, one of the most important of which is the inability to extrude the steel into intricate shapes with sharp lines. When there is a duplication of certain small ornaments, such as rosettes, rustless steel castings are sometimes used. Castings are cleaned, drilled, ground, and chased to bring out fine lines, and are then ready for assembly. File marks must not be left on the castings, as that would cause corrosion.

A hammered natural iron finish is produced in stainless steel by first hammer-forging the piece, which is almost black after leaving the forge. After welding, the unit is pickled to remove the scale and secure a bright finish on part of the surface. Surfaces that are to retain the original color are painted or are coated with black wax and the remaining surfaces are polished with emery cloth or mineral wool. In this way raised surfaces are brightened and deep spots remain black, the whole effect being a simulation of natural hammered iron. Pickling is done in a weak solution of nitric acid, which gives the surface a uniform gray tone.

In making bright iron work of rustless steel such as a modernistic stair, the bar stock is cut to length, holes are drilled and tapped and the ornaments are screwed on. When welding is required the welds are ground to provide a smooth surface. Then the piece is pickled and ground and polished to give it a bright or satin finish. A bright finish is secured by the use of a buffing wheel and a satin finish by going over the surface with an emery cloth. This is done with a sanding machine in which a wide band of endless emery cloth is mounted. After surface finishing, the piece is assembled and the entire surface is wiped.

Arc welding is quite generally used for making joints, except for the lighter work, which is either spot welded or oxy-acetylene welded. Crude, heavy work is usually welded with the electric arc.

Attempts have been made to deep spin rustless steel, but these have not proved successful because of the hardness. However, recently the Rose company resorted successfully to shallow spinning in making dinner plates and beer coasters, which with a hammered finish border have a very attractive appearance. Embossing of leaves and flowers is being done on the stainless steel, but this is slower work than in wrought iron, because of the toughness of the metal and because the steel work-hardens even when embossing simple figures, making repeated annealing necessary.

Great care is required in having sharp tools for drilling and other machining operations and avoiding a stoppage of the tools during operation. Otherwise the extreme work-hardness might necessitate the scrapping of the piece.

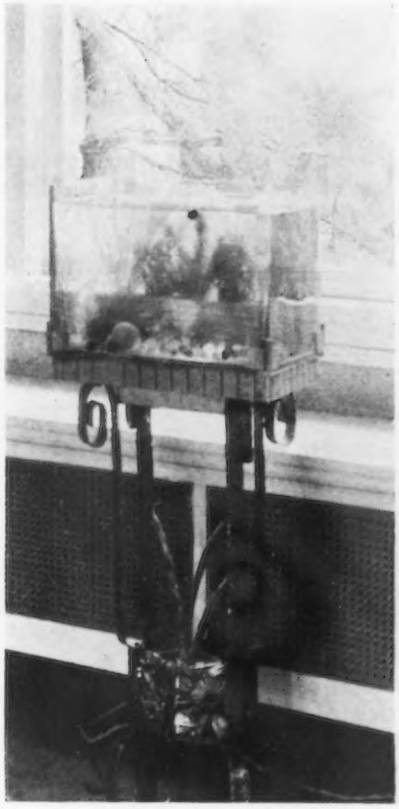
Designs are produced in bright or hammered stainless steel by sandblasting, which was found preferable in some ways to the use of acid. The stencil material is glued to the surface of the steel, the design is traced and the stencil material is cut out over the surfaces that are to be exposed for sandblasting. The sandblasting provides the decorative effects of a rough surface. Should the design call for colored figures, enamel of the desired color is applied to the sandblasted surfaces and the enamel is baked in if desired. The sandblasting process has an advantage over the acid process in cutting the metal, in that it is cheaper and quicker for producing the rougher details. Very fine lines can be produced with the use of photographic films. The photograph-

Railing made of Nevastain RA for the Junior League Penthouse, Cleveland.

ic process similar to that used in making a halftone cut is favored for producing duplicate work.

Some of the newer plating processes have been adopted in the Rose plant for adding color variety to work and for protective coatings where wrought iron and plain carbon steel are used. Some grill work is chromium plated. Cadmium plating is being used to simulate a natural iron finish for outside railings, hardware and other work where a protective coating against corrosion is desired and for interior work where a variety in bright finish is wanted. A recent trend in the ornamental iron field is the more general practice of cold working of steel and less dependence on hot working in forming artistic shapes.

Two types of stainless steel are generally used for ornamental iron work, the 18-8 nickel chrome type and the straight 18 per cent chrome type. A variation of these two types, Nevastain RA, made by the Sharon Steel Hoop Co., which seems to be particularly adapted for ornamental iron work because it is stated that it does not work-harden as in the case of 18-8 material and has better corrosion resistance than the straight 18 per cent chrome steel, is used by the Rose company for most of its stainless steel work.



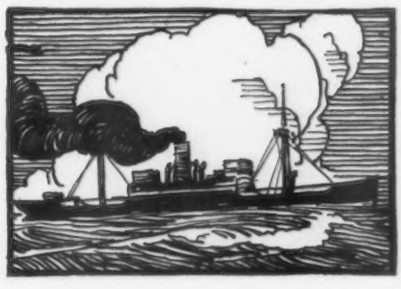
Aquarium of hand wrought stainless steel.

# Soviets Summarize Accomplishments

A SUMMARY of the fulfillment of the five-year plan of the Soviets has been published in English by the State Planning Commission of the U. S. S. R., Moscow. It is a document of 308 pages bristling with statistics. It essays to show that the task set by the five-year plan was successfully carried out in four years; also that the performance of that period is held to make possible now, in the second five-year plan, "the task of finally abolishing the capitalist elements and of classes generally, and of transforming the whole of the working population into conscious and active builders of classless socialist society . . . of finally securing the technical and economic independence of the Union of the Soviet Socialist Republics."

Machine building and the iron and steel industry come in for attention in special chapters. In the new and fundamentally reconstructed branches of engineering for example, the automobile and agricultural machinery industries, it is claimed that the proportion of automatic machines is higher than in the corresponding branches of industry in the United States of America. In the automobile industry in the U. S. S. R., turret lathes represent 8.4 per cent of the total number of lathes; in agricultural machinery manufacture, the figure is 3.1 per cent. A tremendous increase in the use of grinding machines is reported, most of it in the past two years, when 45 per cent of the grinding machines in operation were installed. Likewise pressed steel products are being introduced at an increasing rate. It is stated that no less than 74 per cent of the welding machines were produced in Soviet enterprises.

In 1932 the Electrosila Works turned out a 62,000-kw. hydro-generator for the Dnieper power station. The Kharkov Turbine Works, started in the beginning of 1933, is equipped with powerful machine tools and cranes which will permit of the production of generators of 160,000 kw. in a single unit. The Moscow Turret Lathe Works is credited with an output capacity of 6700 lathes per annum, and the Gorky (Nizhni-Novgorod) Milling Machine Works is given an annual output capacity of 8000 machine tools. A drilling machine factory is being erected in Kharkov.



One of the tasks in connection with the iron and steel industry was to equip "with the most up-to-date technique, particularly American." The capacity of the new units—blast furnaces, open-hearth furnaces and rolling mill—in course of construction at the time the book was compiled "exceeds the capacity provided for in the five-year plan." The difficulties experienced by the masses of the workers and young engineers in mastering the advanced technique are mentioned as accounting for the fact that during the last two years of the five-year period the output of metal did not increase as rapidly as had been envisaged. The result, it is added, was that the industry lagged behind the figures set for it under the plan. On Jan. 1, 1933, there were 102 blast furnaces in operation, with a total volume of 1,298,000 cu. ft., and 15 were in course of construction. Of the new furnaces two have a volume of more than 35,300 cu. ft. each.

Works in the Urals were reconstructed with a view to their specializing on the output of special steels. In 1932 the production of special rolled steel amounted to 555,000 tons. Such steel included chrome-nickel, chrome-molybdenum and chrome-vanadium steel, steel for ball bearings, sheets for transformers, high-speed steel, stainless and heat-resisting steel, manganese and silicon steels, etc. In 1932, about 115,000 tons of steel was made in the electric furnaces, or about 2 per cent of the entire steel output. The making of ferroalloys was started in 1931.

The burden of the book is to prove by comparative figures what expansion has occurred within Russia between the inception of the five-year plan and the end of the period and how the Soviet Government has lifted its rank in industrial activity among the so-called capitalist countries. After including divisions devoted to construction, electrification, fuel, the chemical industry, agriculture, transportation and the like, something is said of the status of labor and living conditions, finances and education.

---

The Carnegie Steel Co., Pittsburgh, and the Illinois Steel Co., Chicago, have issued a supplement to their well known "Pocket Companion," covering CB sections, uniform series. The booklet, containing full information for engineers and designers, supersedes all information relating to CB sections given in prior publications. It contains the properties and all essential detail dimensions of a modified CB series, the changes in this series being incidental to full standardization with other makers of wide flange beams.

# How Attractive Finish Helps Meta

By HERBERT R. SIMONDS

**THIS is the first of a series of articles devoted to the large and expanding branch of the metal-working industry, which, for want of a better term, may be called "metal finishing." Almost any material which is to be marketed must receive some sort of a surface finish, even if it is just a coat of paint. Some of the more important types of finish on metal products which will be discussed in this series are the following: Plating, rust proofing, galvanizing, enameling, polishing, buffing, chemical casing, electrolytic surfacing, heat treating, cladding, and painting.**

**Preparatory to nearly all of these processes are certain cleaning and abrasive operations which are so closely associated with the finish of metal parts that they also are included in the present series. The accompanying article deals with the significance of finishes in relation to the metal industry as a whole. It emphasizes some of the commercial features of appearance and discusses the importance of correct selection of finish for a specified purpose.**

▼ ▼ ▼

ABOUT a year ago a manufacturer of small tools brought out a new type of screw driver with high hopes of its success. Mechanically the screw driver had unusual merit, but in appearance it was just a screw driver and sales were disappointing. Make a good screw driver and the world will wear a path to your door, the manufacturer thought, and waited—but nothing happened.

Finally, on an impulse, he did an unusual thing. He called in a style expert to design a machinist's tool and the screw driver was rebuilt from an appearance point of view. Among other things it was given a hexagonal shank, a bakelite handle, and an over-all high polish. Sales immediately commenced to improve and now that screw driver has definitely arrived.

This little incident is typical of the appearance appeal in the metal working field. Machine tools and typewriters alike have become style conscious, and the sturdy metal, steel, with the assistance of alloying elements and with new finishing technique, has moved up into high hat circles — to be used for cigarette lighters, vanity cases, and even for jewelry. Chrome plated watches, chrome nickel watch chains, and bonderized belt buckles now are being worn.

The demand for better finishes which received its first impetus in the automobile manufacturing industry has now extended to cover nearly all marketed materials. Contrary to the general impression that the increased use of stainless steels and other noncorrosive alloys has reduced the field for metal finishes, the opposite seems to be the case. The use of base metals of the stainless variety has apparently encouraged the use of plated metal parts.

And in addition the favorable impression which the white metals made on architects encouraged investigation into the possibilities of other metals and other metal finishes in the building industry. A modern steel house at the Chicago World's Fair has an enameled steel exterior and glazed steel shingles. Its bath rooms are lined with enameled steel tile and other metals with numerous finishes embellish both interior and exterior.

Certainly the need for polishing stainless steel has spread polishing to other metals. Several years ago, along with the development of nickel chromium sheets, there followed the development of sheet polishing machines installed at the mill as part of the manufacturing sequence. Polishing was considered essential on a chromium alloy sheet, as an important feature of this material is its appearance, and the ultimate in this appearance is secured through polishing. A manufacturer of sheets who had installed a polishing machine for chrome steel sheets, and who was of an experimental turn of mind, decided to run some carbon steel sheets through his polishing machine. The

# Products Sales

This steam fitter is pleased because he has a wrench with a new type of colored finish.

result was unexpected. The customers who received the sheets with the new finish were delighted and specified that finish on future shipments.

### Competition Forcing Better Finishing

Experiences such as these, coupled with increasing competition, are forcing more and more emphasis on the question of appearance. Today there is an insistent demand for attractive finish on utility products which a few years ago were considered entirely out of the "appearance" field. An example of this is the demand for a colored hack saw blade. "Can hack saw blades be lacquered?" This question was put up to a manufacturer and was successfully solved with a lacquer which gave a bright gold finish at very slight cost. The saw blade sales jumped sharply as a result.

### Nature of a Metal Finish

One definition of a metal finish proposed about ten years ago was "a coat applied or created on the surface of metal to give characteristics differing from those of the base metal." This does not quite cover the case of patina which is the result of the action of certain minute organisms, and it runs into difficulty with the clad metals, but it is sufficiently broad to cover the range of subjects to be included in the present series. How best to change the surface characteristics of metal is a question which long has occupied the attention of metallurgists and manufacturers. It is a question which involves the nature of the metal, the nature of the desired surface characteristics, and the cost.

Metal may be treated to give it a rough surface which makes for a strong bond with many types of applied coats. In fact engineers are just waking up to the fact that metal lends itself excellently to almost any sort of surface treatment. Fifty years ago tintypes were in vogue. Now moving pictures are presented on metal screens. Steel furniture is given a wood-like finish which challenges detection from the original. Wall panels made up of steel sheets backed by sound deadening composition are made to so closely imitate marble that close inspection fails to reveal the difference. The marble design is transferred photographically from actual marble slabs by a process which will be described in a later article.

### Elaborate Preparation Often Pays

Metal parts which are to receive a high finish usually must be cleaned and pickled before the actual finishing operations start. In the case of an automobile bumper which is to be chromium plated, the sequence may be cleaning, pickling, nickel plating, washing, copper plating, washing, nickel plating again, washing—drying — polishing — buffing, washing again, and finally chromium plating. The reason for such an extensive sequence, strangely enough, is one of economy. The elaborate preparation makes it possible to use an extremely thin and still effective chromium plate. This general subject will be discussed more fully in an article devoted to plating.

### Cost of Finishing Metal

From the point of view of business economics, the cost of surfacing an article to give it a more attractive appearance must be less than the amount saved in sales expense as the result of the better finish. Otherwise, the article should be left unfinished. Suppose a firm makes a good pencil sharpener, but gives it an inexpensive, dipped finish, and sells 1000 a week at a profit of 15 cents each. The

Two operators (at left) press a wooden block against an endless coated belt and in this way put a high polish on unusually large steel plates.

An experienced polisher (at right) takes great pains in putting a bright finish on parts which are to be used for bank grill work.

advisability of giving the sharpener a more appealing appearance may be expressed in simple terms.

$S_2 \times P_2$ must equal $S_1 \times P_1$

where $S_2$ represents the new total sales, $P_2$ the new reduced unit profit, $S_1$ the former total sales and $P_1$ the former unit profit. Here the former unit profit less the new unit profit equals the unit cost of the new finish, Actually, however, the equipment cost should not be charged to merely a one-year period, and the estimate of increased sales as the result of the finishing may be too low or too high. If the sales should jump to 3000 the new weekly profit would be over $200 or a net increase of $50.

The actual cost of plating, or in fact of any type of metal finishing, has so many variables that it is difficult to give even a rough indication. A large manufacturer of safety razors found that he could put a serviceable gold plate on the razor handle for about ¾c. each, but in this case the plating was done on an elaborate automatic continuous machine with an almost negligible labor charge and with high recovery of the gold plating solution from the rinse tanks. Another manufacturer cadmium plates a 3-in. coiled spring for ½c. on a production basis. Formerly the cost of plating this same spring ran as high as 2c.

An example of new types of metal finish for architectural effect. Almost every part visible is metal.

F or $P_1 - P_2 = F$. But F of course must include the cost of equipment and therefore varies with the length of the sales period. It is customary to consider a period of one year in studying the probable effect of a better finish. The pencil sharpener problem was worked out something as follows:

Present sales—1000 a week.
Present unit profit—15c.
Expected sales after plating—2000 a week.
Cost of polishing and plating equipment—$5,000.
Cost of equipment per week on one year basis—$100.
Unit cost of equipment—5c.
Unit cost of materials and labor plating—3c.
Total unit cost of plating, F—8c.

Substituting in the equation $P_1 - F = P_2$ gives 15c. — 8c. = 7c., which is the estimated new unit profit. The former weekly profit on 1000 sales basis was 1000 x 15c. = $150. The new weekly profit on 2000 sales basis equals 2000 x 7c. or $140.

Strictly speaking, on figures alone, this result would indicate a net loss due to plating the pencil sharpeners.

One of the variables in most plating is the cost of electric power. Chromium plating calls for high current density and this means that the cost of equipment is greater than for nickel plating. For a current density of 1000 amperes the plating equipment, including electrical apparatus, may cost $2,500, whereas for a current density of 10,000 amperes the equipment cost will be about $17,000.

In the field of buffing and polishing, the cost varies with the increase in fineness of finish. A good polish may be secured with a wheel using No. 120 size of abrasive grain, and a finer finish means an additional operation using a wheel with a finer abrasive, say No. 150 or No. 220, which of course means additional expense.

### Extent of Metal Finishing in Industry

Some idea of the extent of the metal finishing industry may be gained from the Government census figures. The manufacture of buffing and polishing wheels was valued at $4,500,000 in 1929. One engineer has given a rough average of $100 worth of finishing for every $1 in cost of polishing wheel, but at the same time he admits the difficulty of setting any such average. However, it gives at least a rough basis of the value of buffing and polishing operations. On this basis the Government's figure of $4,500,000 as the cost of wheels, becomes $450,000,000 in the value of the polishing and buffing operations. The value represented by galvanized finish on iron and steel runs into many millions of dollars each year. Government statistics for 1929 give 385,000 tons of pipe galvanized in the rolling mill industry and an additional 172,000 tons galvanized outside of the rolling mill industry. In the same year 31,000 tons of galvanized or rust proofed automobile skid chains were produced and 1,000,000 kegs (100 lb. each) of galvanized nails. In 1930 there were 31 establishments in the country producing galvanized plates, sheets, and strips, and having a total production of galvanized products of approximately 1,000,000 tons with a total value of $77,500,000.

A close second to the galvanizing industry is the enameling industry. The value of enameled metal ware produced in the United States in 1931 was $130,000,000. Of this total value $23,000,000 represented vitreous enamel and of the total of $130,000,000 more than half or $69,000,000 represented the value added by the process of manufacturing the finished article from the raw material. In the field of electroplating, 464 establishments were reported in 1931, with 4000 workers, and a total value of products of $13,000,000. Of this amount $10,000,000 represented the value added by manufacturing.

### Selecting the Best Finish

With so many types of metal finish ranging from a coating of rubber latex to a high polish of the base metal, it is difficult for the manufacturer or sales manager to determine the best finish for his product. In many cases the finish must fulfill a utilitarian purpose, and in these instances the selection is more readily specified. If the article finished is the reflector of an automobile headlight, for instance, this problem has been already solved through long ex-

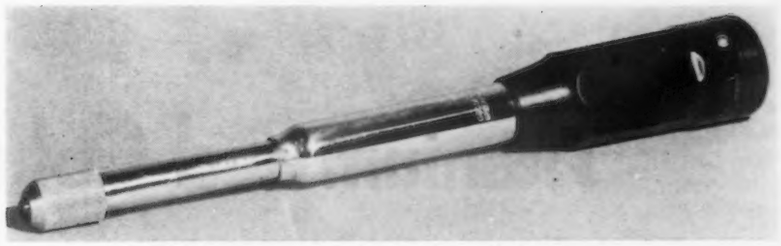
▲ ▲ ▲

IN commenting on the value of appearance of metal products, C. R. Bragdon, secretary, Ault & Wiborg Corpn., New York, has said that the importance of giving any product its most attractive final appearance is generally recognized in the industrial world today. Continuing, he says:

*"Everywhere we see how consumer interest is stimulated and sales multiplied by taking an ordinary article such as a kitchen knife, can opener, or a dust pan, which used to be supplied in plain metal or in dull black, and dressing it up in a neat color scheme. Even tacks and nails now come painted or lacquered. At first thought it might seem that the cost of finish on such humble articles would be out of proportion to the increased selling price or increased volume of sales. Usually the reverse is the case, so that the manufacturer who does not avail himself of the value of a better finish on his product is actually losing money. Much depends upon the choice of method of application and upon the judicious use of color where it will do the most good. The cost of a metal finish, based on the surface area to be covered, may be roughly estimated and varies from two- or three-tenths of a cent a square foot for a single color coating for products such as hack saw blades, to three or four or more cents a square foot for multiple coats of lacquer or for developing closely imitated wood grain finishes on metal furniture."*

Mr. Bragdon gives some concrete examples of increased sales due to better finish. He says that several years ago when white enamel was substituted for the old-fashioned black japan finish on bread and cake boxes and other kitchen ware, sales were increased by 300 or 400 per cent, and more recently when the popular shades of apple green, ivory, orchid and blue came into vogue, there was a further marked increase in sales.

▼ ▼ ▼



Sales of this tool increased when it was given this better finish.

perience. But where the finish is chiefly for appearance, many questions such as relative cost and sales value must be taken into account. Even if the problem is chiefly one of rust proofing, a large number of finishes is offered for selection. The question is frequently asked: "Which is the best process—galvanizing, sherardizing, or parkerizing?" Leonard F. Hirsch of the Philadelphia Rust Proof Co., in commenting on this question, says: "There is no answer. It is our contention that for each article there is one particular rust proofing process best adapted. Items to be considered in determining that one best method are ease of applying, nature of bonding with the base metal, degree of durability desired, and cost."

Taking the specific example of a casement window, Mr. Hirsch analyzes the problem step by step. First it is necessary to clean the metal. This must be done after the window has been assembled and experience indicates that a sand blast will not reach certain corners and hidden spots, whereas acid solutions will permeate to all exposed surfaces. He therefore advises standard practice of alkali cleaning followed by acid pickling. The following is Mr. Hirsch's enumeration of the advantages and disadvantages of different processes of rust proofing with reference only to the one product, steel casement sash:

GALVANIZING

A good coating, but it warps sash and, when straightened, the coating is destroyed in certain places. It also interferes with the fit of accurately made parts. It is difficult to paint unless treated.

SHERARDIZING

Impossible to sherardize sash of any large size unless it is done before it is assembled, in which case the sherardizing would be destroyed by welding. Consequently there would be no rust proofing at these parts.

ZINC PLATING

Would be good if plated heavy enough, about 0.001 in. thickness, but for commercial purposes this is rarely done. In addition, the zinc does not plate uniformly and there will be a very thick coating on irregular surfaces and in some corners very little zinc. Furthermore, if the sash is assembled with projecting parts, there are certain places that would not be properly plated where they overlap.

CADMIUM PLATING

The things stated about zinc are more or less true about cadmium, with the exception that the coating need be only 0.0004 in. thick to get the same protection. In addition, cadmium will deposit better in irregular places and recesses. However, it is difficult to get paint to adhere properly to cadmium.

PARKERIZING

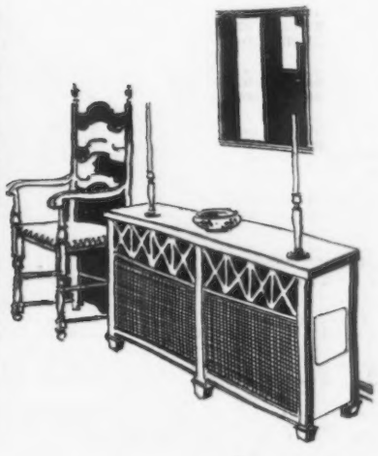
This is a chemical method of rust proofing which will take all over on a sash because the sash is simply immersed in a solution. It is a cheaper process to apply than any of the above, and when painted, the paint will hold without any difficulty. The resulting finish will withstand exposure to the weather probably longer than any of the others.

Mr. Hirsch says: "We make a similar analysis of each product which comes to us for rust proofing. In the case of the steel sash we selected parkerizing as having fewer defects than the other processes. Here the question of painting is one of chief consideration. Sash is almost always painted, and the best water-proofing process, therefore, must be one which leaves an excellent base for paint."

The first consideration in the problem of selection of metal finish is a knowledge of the many available finishes and their characteristics.

Subsequent articles in this series are intended to give this knowledge to the manufacturer of metal products.

Realistic wood grain designs are applied to steel furniture by roller.



# Titanium and Columbium in Plain High

TITANIUM and columbium in proper proportions act as effective softeners in the high-chromium steels. This fact was learned as the result of an extensive investigation made by Dr. Frederick M. Becket (president, Union Carbide and Carbon Research Laboratories, Inc., Long Island City, N. Y., and president of the American Institute of Mining and Metallurgical Engineers) and Russell Franks (research metallurgist of the laboratories). In their studies different elements known to have a strong affinity for carbon were alloyed with steels containing relatively small to large percentages of chromium. The objective was a soft and ductile steel having optimum corrosion resistance, seeing that over against the property of high-chromium steels to resist corrosion and oxidation at elevated temperatures is a tendency to exhibit great hardness and also a sluggishness to thermal changes, such as requiring long periods of annealing.

There are many applications, Doctor Becket emphasizes, in which plain chromium steels would prove highly useful if greater softness and more ductility could be obtained together with substantial freedom from air-hardening, all without sacrificing resistance to corrosion and oxidation at high temperatures. The results of the research have been compiled and, accompanied by extended comments, were presented as a paper to the Detroit meeting of the American Institute of Mining and Metallurgical Engineers. The following notes comprise a considerable part of the paper:

### Desirable Proportions of the Element

The results obtained through additions of titanium and columbium were decidedly interesting — indeed, they were surprising. Titanium should be present in a ratio of five to seven times the percentage of carbon, and for columbium a ratio of eight to ten is required. Although it should be understood that smaller ratios afford some improvement, large excesses of titanium and columbium over the recommended ratios bring about detrimental effects through hardening of the solid solution of iron and chromium. One of the marked characteristics of the plain high-chromium steels containing titanium or columbium is the facility with which they may be hot-worked, a result of freedom from the air-hardening tendency.

The physical properties of some of the wrought steels containing titanium are presented in Table 1. It should first be observed that in the as-rolled condition the low-carbon steel containing about 3 per cent chromium is comparatively ductile and soft, whereas by reason of air-hardening the 5 per cent chromium steel is relatively hard and considerably less ductile. Here emphasis should be laid on the marked difference in physical properties between the untreated (substantially titanium-free) and the titanium-bearing steels, both in the as-rolled condition. As an example, the ductility and softness of the 5.41 per cent chromium steel containing 0.11 per cent carbon and 0.75 per cent titanium are not approached in the as-rolled condition by a steel of similar analysis without titanium. The commercial value of this difference need not be emphasized.

The properties of the titanium-bearing steels can be further improved through annealing at temperatures between 700 and 900 deg. C.; and, to stress a point of practical importance, this may be accomplished by holding the steels for only a few minutes at temperatures approaching the upper limit of this range. Annealing at temperatures much above 900 deg. C. greatly decreases the tough-

Table 1.—Physical tests on plain chromium steels containing titanium and columbium. Standard test pieces taken from 1-in. round bars.

| Cr, Per Cent | C, Per Cent | Ti, Per Cent | Cb, Per Cent | Condition of Metal | Yield Point, Lb. per Sq. In. | Max. Stress, Lb. per Sq. In. | Elongation, Per Cent in 2 In. | Red. of Area, Per Cent | Izod Impact Ft-lb. | Erichsen Value | Brinell Hardness |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.05 | 0.07 | | | As rolled | 53,000 | 80,000 | 22 | 64 | 72 | 6.9 | 126 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 43,000 | 60,000 | 43 | 81 | 96 | 8.8 | 116 |
| | | | | Heated at 900° C. 10 min. and air-cooled | | | | | | 7.3 | |
| 3.22 | 0.09 | 0.73 | | As rolled | 46,000 | 72,500 | 31 | 74 | 86 | 8.2 | 126 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | | | | | | 9.5 | |
| | | | | Heated at 900° C. 10 min. and air-cooled | 37,000 | 68,000 | 28 | 75 | 111 | 10.0 | 116 |
| 5.44 | 0.10 | | | As rolled | 149,500 | 181,000 | 5 | 12 | 22 | 5.5 | 375 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 74,000 | 92,500 | 26 | 74 | 94 | 7.9 | 153 |
| | | | | Heated at 900° C. 10 min. and air-cooled | | | | | | 5.5 | 340 |
| 5.41 | 0.11 | 0.75 | | As rolled | 84,000 | 100,000 | 18 | 68 | 24 | 6.3 | 163 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 28,000 | 61,000 | 37 | 78 | 63 | 9.0 | 112 |
| | | | | Heated at 900° C. 10 min. and air-cooled | 29,000 | 62,000 | 44 | 79 | 112 | 9.5 | 112 |
| 5.62 | 0.09 | | 1.04 | As rolled | 98,000 | 111,000 | 16 | 62 | 59 | 6.0 | 192 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 32,000 | 62,000 | 29 | 78 | 108 | 8.1 | 112 |
| | | | | Heated at 900° C. 10 min. and air-cooled | 61,000 | 82,000 | 27 | 70 | 105 | 8.0 | 143 |
| 13.60 | 0.13 | | | As rolled | 149,000 | 204,000 | 3 | 8 | 30 | 5.0 | 418 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 61,000 | 91,000 | 24 | 60 | 68 | 8.4 | 143 |
| | | | | Heated at 900° C. 10 min. and air-cooled | 117,000 | 149,000 | 4 | 6 | 8 | 3.5 | 241 |
| 13.35 | 0.11 | 0.85 | | As rolled | 36,000 | 63,400 | 25 | 70 | 10 | 6.7 | 126 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 39,000 | 63,400 | 28 | 70 | 22 | 8.8 | 112 |
| | | | | Heated at 900° C. 10 min. and air-cooled | 36,000 | 64,000 | 33 | 75 | 30 | 9.4 | 112 |
| 12.42 | 0.10 | | 1.18 | As rolled | 39,200 | 63,300 | 20 | 53 | 15 | 6.8 | 121 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 37,000 | 64,500 | 31 | 65 | 37 | 7.6 | 116 |
| | | | | Heated at 900° C. 10 min. and air-cooled | 39,000 | 63,000 | 37 | 73 | 77 | 9.2 | 112 |
| 13.32 | 0.34 | 1.76 | | As rolled | 49,000 | 76,000 | 25 | 55 | 3 | 6.3 | 143 |
| | | | | Heated at 1000° C. 5 min. and air-cooled | 44,000 | 74,500 | 27 | 53 | 15 | 8.6 | 124 |
| 13.34 | 0.58 | 2.13 | | As rolled | 64,000 | 100,000 | 21 | 47 | 3 | 6.0 | 179 |
| | | | | Heated at 1000° C. 5 min. and air-cooled | 55,600 | 83,000 | 26 | 51 | 4 | 7.7 | 159 |

# High-Chromium Steels

**A NEW chromium steel is offered to industry by Messrs. Becket and Franks, of the Carbide and Carbon laboratories. Their experimental and commercial work convinces them that titanium or columbium introduced into plain high-chromium steels will broaden the field of utilization of such steels, securing desirable softness, amenability to deep drawing operations, response to heat treatment and withal retention of resistance to corrosion and oxidation at elevated temperatures.**

ness, although the steels are not in this way appreciably hardened.

### Good Results Even with High Carbon

Similar results are shown in Table 1 for the low-carbon titanium-treated 12 to 14 per cent chromium steels. The effectiveness of titanium is particularly demonstrated in the two 13 per cent chromium steels containing respectively 0.34 and 0.58 per cent carbon. These examples are cited for their interest, but it should not be inferred that the full titanium treatment is advocated for chromium steels so high in carbon.

Table 3 gives the figures obtained from titanium-bearing steel plates of ½ in. thickness containing 6 and 13 per cent chromium. These plates were rolled in a commercial mill from 4 x 4-in. billets, which were forged from 6 x 6-in. ingots.

Table 2 gives the results obtained from treated and untreated low-carbon 18 and 26 per cent chromium steels. It is well known that although these plain chromium steels are not of the hard variety after hot-rolling, low ductility is characteristic; furthermore, it is known that comparatively long annealing periods are required to improve their ductility. A significant effect of the titanium addition is again brought out; because, in addition to the softness of these steels in the hot-rolled condition, the annealing period required to further improve the properties is of short duration, and the steels finish with greater ductility and softness than those lacking titanium.

All these steels have been subjected to the generally accepted corrosion tests. The results disclose that in steels containing less than about 12 per cent chromium an appropriate addition of titanium augments the resistance to oxidizing media. Less pronounced in this respect is the effect of titanium in the higher chromium low-carbon steels, no doubt because they are inherently more resistant under oxidizing conditions.

### A 7 to 9 Per Cent Chromium Steel Looks Promising

Tests have been conducted under atmospheric conditions embracing titanium-treated and untreated low-carbon 5, 6, 7.5 and 9 per cent chromium steels. These samples and others of the higher chromium groups have been exposed for a long period of time. Briefly, the most important feature uncovered by these tests is that through the agency of titanium there appear interesting commercial possibilities for a steel containing 7 to 9 per cent chromium—a steel not completely resistant to staining but nonetheless one which affords a great measure of protection against progressive rusting. Even without annealing, the combined properties of steel of this class are such as to indicate numerous commercial applications.

The various groups of plain, high-chromium steels discussed in this paper are all employed commercially at elevated temperatures. For this use the advantages accruing from the ad-

**Table 2.—Physical tests on 18 and 26 per cent plain chromium steels containing titanium and columbium. Standard test pieces taken from 1-in. round bars.**

| Cr, Per Cent | C, Per Cent | Ti, Per Cent | Cb, Per Cent | Condition of Metal | Yield Point, Lb. per Sq. In. | Max. Stress, Lb. per Sq. In. | Elongation, Per Cent in 2 In. | Red. of Area, Per Cent | Brinell Hardness | Erichsen Value |
|---|---|---|---|---|---|---|---|---|---|---|
| 18.29 | 0.07 | | | As rolled | 57,000 | 92,500 | 7 | 14 | 170 | 5.5 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 51,000 | 83,500 | 30 | 55 | 143 | 7.5 |
| | | | | Heated at 900° C. 20 min. and air-cooled | 59,000 | 97,000 | 9 | 18 | 159 | 6.0 |
| 18.65 | 0.13 | 0.78 | | As rolled | 49,000 | 71,500 | 31 | 69 | 131 | 7.0 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 50,000 | 76,000 | 29 | 66 | 131 | 7.0 |
| | | | | Heated at 900° C. 20 min. and air-cooled | 40,000 | 68,000 | 32 | 66 | 118 | 9.0 |
| 19.20 | 0.07 | | 1.00 | As rolled | 52,000 | 72,000 | 22 | 41 | 149 | 6.5 |
| | | | | Heated at 750° C. 4 hr. and air-cooled | 43,000 | 69,500 | 31 | 65 | 137 | 8.0 |
| | | | | Heated at 900° C. 20 min. and air-cooled | 45,000 | 72,000 | 29 | 63 | 118 | 8.5 |
| 26.28 | 0.14 | | | As rolled | 62,000 | 89,000 | 9 | 11 | 187 | 6.0 |
| | | | | Heated at 875° C. 12 hr. and water-quenched | 56,000 | 83,000 | 26 | 51 | 159 | 8.0 |
| | | | | Heated at 900° C. ½ hr. and air-cooled | 49,000 | 66,000 | 5 | 6 | 137 | 7.9 |
| 26.90 | 0.18 | 1.20 | | As rolled | 66,000 | 86,500 | 29 | 64 | 163 | 7.0 |
| | | | | Heated at 875° C. 12 hr. and water-quenched | 57,000 | 83,000 | 26 | 56 | 137 | 8.0 |
| | | | | Heated at 900° C. ½ hr. and air-cooled | 58,000 | 83,000 | 28 | 58 | 143 | 8.5 |

Table 3.—Physical tests on ½-in. plates of 6 and 13 per cent plain chromium steels. Rolled in commercial mills.

| Cr, Per Cent | C, Per Cent | Ti, Per Cent | Mn, Per Cent | Si, Per Cent | Condition of Metal | Yield Point, Lb. per Sq. In. | Max. Stress, Lb. per Sq. In. | Elongation, Per Cent in 2 In. | Red. of Area, Per Cent | Izod Impact, Ft-lb. | Brinell Hardness | Rockwell B Hardness |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.93 | 0.13 | 0.90 | 0.56 | 0.39 | As rolled | 39,800 | 66,100 | 34 | 68 | 69 | 128 | 86 |
| | | | | | Heated at 900° C. 10 min. and air-cooled | 34,200 | 67,100 | 37 | 68 | 74 | 112 | 62 |
| 13.35 | 0.11 | 0.85 | 0.46 | 0.19 | As rolled | 44,300 | 66,000 | 35 | 60 | 28 | 126 | 88 |
| | | | | | Heated at 900° C. 10 min. and air-cooled | 36,000 | 59,400 | 34 | 70 | 51 | 112 | 63 |

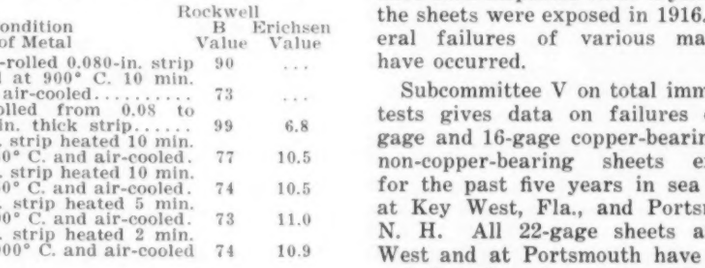
dition of titanium are most prominently developed in the steels of the lower chromium varieties. Taking the single case of exposure to 750 deg. C., it is observed from the accompanying chart that titanium considerably increases the resistance to oxidation of the 5 to 6 per cent chromium steel. Weekly removal of the scale is unfavorable to titanium in the relationships shown, but this method presented opportunities to observe that titanium-treated steels of this class have a more adherent scale. Moreover, these titanium-treated steels retain their toughness after relatively long periods at temperatures up to 650 deg. C., the highest temperature at which the toughness tests have so far been conducted.

Plain low-carbon 18 per cent chromium steels continue to render excellent service in many applications. An improvement greatly desired is increased softness and amenability to deep-drawing operations, particularly by the fabricator, and the addition of titanium to this steel assists considerably in this direction. Some of the properties of titanium-bearing steels of this class are shown in Table 4.

TABLE 4.—*Tests on 18 Per Cent Plain Chromium Steel Strip Containing Titanium (Cr, 18.65 per cent; C, 0.11; Ti, 0.65)*

| Condition of Metal | Rockwell B Value | Erichsen Value |
|---|---|---|
| As hot-rolled 0.080-in. strip | 90 | ... |
| Heated at 900° C. 10 min. and air-cooled | 73 | ... |
| Cold-rolled from 0.08 to 0.04-in. thick strip | 99 | 6.8 |
| 0.04-in. strip heated 10 min. at 750° C. and air-cooled. | 77 | 10.5 |
| 0.04-in. strip heated 10 min. at 850° C. and air-cooled. | 74 | 10.5 |
| 0.04-in. strip heated 5 min. at 900° C. and air-cooled. | 73 | 11.0 |
| 0.04-in. strip heated 2 min. at 1000° C. and air-cooled | 74 | 10.9 |

Titanium has dominated the foregoing description. However, it should be emphasized that all the beneficial effects obtained by this element have been secured also through the addition of columbium, a metal which in the form of a ferroalloy can be incorporated with high recovery under good melting practice appropriate to the high-chromium steels.




Results of oxidation tests on titanium-treated and untreated chromium steels at 750 deg. C.

## Reports on Corrosion of Iron and Steel

THE reprinted report of Committee A-5 on Corrosion of Iron and Steel of the American Society for Testing Materials is now available in a pamphlet of 36 pages.

A detailed record of the failures in the Annapolis atmospheric corrosion tests comparing copper-bearing with non-copper-bearing materials is given. The 259 sheets of No. 16 gage material and 227 sheets of No. 22 gage have been inspected twice a year since the sheets were exposed in 1916. Several failures of various materials have occurred.

Subcommittee V on total immersion tests gives data on failures of 22-gage and 16-gage copper-bearing and non-copper-bearing sheets exposed for the past five years in sea water at Key West, Fla., and Portsmouth, N. H. All 22-gage sheets at Key West and at Portsmouth have failed and there have been many failures in the 16-gage sheets at Key West.

The subgroup working on field tests of metallic coatings presents extensive tabulations and graphs giving the results of the latest inspections of galvanized and uncoated sheets. Results of inspections on coated hardware, structural shapes, tubular goods, etc., are given in a series of tables.

The report includes also the revised Standard Methods of Determining Weight of Coating on Zinc-Coated Iron or Steel Articles (A90-33). Copies can be obtained from the society, 1315 Spruce Street, Philadelphia, at 50 cents each.

## Torsion Impact Properties of Hardened Tool Steel

DEVELOPMENT of an impact test applicable for use with hardened and slightly tempered carbon steels is briefly outlined in a paper by G. V. Luerssen and O. V. Greene of the Carpenter Steel Co., Reading, Pa., in their paper, "The Torsion Impact Properties of Hardened Carbon Tool Steel." In this test, specimens are fractured under torsional impact. Torsion impact data obtained on three carbon tool steels (1.06, 1.03 and 0.90 per cent C) are included.

The authors show that there are three peaks of maximum toughness in hardened carbon tool steel occurring at relatively low drawing temperatures, the positions of which can be altered by varying treating conditions such as heating media, quenching temperature and drawing time. The effect of an inherent characteristic such as timbre on steels of the same analysis and the influence of variable carbon content is included. The authors also offer suggestions as to the causes of these peaks of maximum toughness.

# High Resistance to Fatigue at High Hardness

**TEMPER brittleness may be a virtue, says this year's Campbell Memorial Lecturer, of the Steel Treaters, H. J. French. The investigations he reviews suggest to him that high resistance to fatigue at high hardness calls for the introduction of those elements which tend to retard in the martensitization the decomposition rate of austenite. Some steels susceptible to temper brittleness show strengthening on overstressing in fatigue tests.**

THE chief technical event of the annual convention of the American Society for Steel Treating has come to be the Campbell Memorial Lecture. This year, at Detroit, a few weeks ago H. J. French, metallurgist, research and development department, International Nickel Co., Inc., New York, had the honor. His subject was "Fatigue and the Hardening of Steels." He discussed results of research of the Battelle Memorial Institute, Columbus, Ohio, and of the research department of the Nickel company. A general summary of the lecture follows:

The important position occupied by hardened steels in our present civilization is, as is well known, not solely the result of high hardness and static strength but is due in no small part to their ability to withstand repeated stressing without failure or damage —as in the case of springs, gears, bearings, shafting, battering tools and so on—indicating the importance to industry of the resistance of hardened steels to what, commonly, has been called fatigue. Since repeatedly applied stresses usually also comprise a searching method of appraisal of the quality of metals, the resistance of steels to repeated stress may be made the principal basis of evaluation of the processes of hardening.

### Fatigue Limits of High Hardness Steels

The fatigue limit of a metal may be defined as that stress below which fracture will not occur if the metal is subjected to an infinitely larger number of repetitions of stress. In general, steels have well defined fatigue limits which usually are found at 35 to 55 per cent of their tensile strengths. This applies both to carbon and alloy steels at hardness below 450 Brinell. At higher hardness, the fatigue limits, and hence the ratios between the fatigue limit and the tensile strength, are somewhat in doubt. A complete theory of fatigue is not yet available but certain observations on the behavior of metals when subjected to repeated stresses are enlightening and useful as a prelude to the consideration of the fatigue resistance of hardened steels.

Hard martensites require appreciable proportions of retained austenite, or decomposition products, for high resistance to fatigue, a condition which is probably the result of the role of austenite or the decomposition products in altering the residual stresses in martensitized steels or in allowing readjustments under subsequent repeated stress.

High resistance to fatigue at high hardness may, therefore, be most readily obtained by the introduction into the steel of those elements which tend to retard the decomposition rate of austenite at low temperatures. Retained austenite appears to be much less important in medium carbon steels which are not so hard but more plastic when quenched.

### Fatigue Limits of Alloy Steels

The fatigue limits (in reversed bending tests) produced by age-hardening of copper-silicon and nickel-aluminum steels, at around 400 Brinell, were approximately the equivalent of those obtained in martensitized and tempered steels at the same hardness. The resistance to occasional overstress of these age-hardened steels was not so good, however, as that of the martensitized and tempered steels, but the results obtained indicate that age-hardening, which heretofore has been viewed to be more of a liability than an asset in iron alloys, can provide useful properties.

Further studies of the fatigue resistance of age-hardened steels will be required before any comprehensive appraisal can be made but already it should be apparent that the processes of martensitization are no longer in the unique position which they formerly held in meeting the requirements of high hardness, high strength and resistance to fatigue in ferrous metals.

Nickel-silicon steels, susceptible to temper brittleness, showed either strengthening on overstressing in fatigue tests or initially high fatigue ratios, up to about 60 per cent. It was suggested that these properties might be the result of aging effects, which are now known to be widely prevalent in steels, and which are believed to be due to the decay of supersaturated solid solutions. It was postulated that decay was initiated in the repeated stress tests at atmospheric temperatures by crystalline slip. Under certain conditions this exerted a favorable influence on the mechanical properties of the steel.

While it is not certain that the precipitated particles, believed to be responsible for temper brittleness, were the same ones which caused the desirable strengthening by overstressing in the fatigue tests, circumstantial evidence suggests that the two sets of effects originated from the same source.

Further researches will be required to establish the nature of these effects and to define the conditions under which they occur, but the question may be asked whether temper brittleness, long accepted as a characteristic without virtue, may not, under certain conditions, ultimately be shown to have some assets.

---

THE elevators in the RCA building at Rockefeller Center, New York, are controlled by "electric eyes." Although the cars travel at 1400 ft. a min., they are leveled exactly at any floor by two photo-electric cells. The equipment was installed by Westinghouse Electric & Mfg. Co.

# Hardening Cast Iron by Hea

**PLAIN gray irons as well as alloyed ferrous castings are amenable to heat treatment along the lines practiced for steel. Including the original investigations, the author presents a summary of experimental work and the procedure to be followed in hardening cast iron. Complex castings show a remarkable freedom from cracking on quenching, and generally the lowest hardening temperature possible is accompanied by the best results.**

THE need for a method of hardening gray cast iron in a manner similar to that employed in hardening steels has been appreciated for a long time. There are instances recorded in old pocket books and encyclopaedias where hardening methods for gray cast iron are recommended. Most of these methods involve practices such as are familiar in the hardening of steels. Heating and quenching in liquids, such as water, oil or vitriol; treating the surfaces in the heated condition with potassium ferricyanide are among some of the recipes given which can be cited. It is a fact that these methods of hardening gray irons have been practiced continuously for many years in certain industries. In the manufacture of textile machinery, for example, various types of cast iron spindles have been hardened regularly by such methods.

Apart from such examples the hardening of cast iron by heat treatment has never found general favor with engineers. In fact, it has been considered hitherto to be impracticable on the probable grounds that the strength properties both of the material and the actual castings are impaired and rendered unreliable.

Recent extensive experiment has shown that gray cast irons can be hardened by various heat treatments, which can be controlled in a like manner to those applied to the various steel alloys. Furthermore, the mechanical properties of cast irons treated in this manner rather than being impaired are actually substantially improved. Experimental results and practical experience gained with the application of such treatments to a variety of cast irons have now been sufficiently extensive and the beneficial effects of such treatments on the mechanical properties so clearly demonstrated that the engineers' doubts on this score can be finally dismissed. As experience in these processes of hardening cast irons becomes more widely disseminated and the possibilities of such hardened irons more widely known, they will go far in extending and consolidating the use of cast iron as an engineering material.

### Oil Hardening and Tempering

Experiments have shown that in suitable thin sections plain unalloyed cast iron is capable of being hardened by oil quenching from suitable temperatures above the $AC_3$ point. In a like manner, plain chromium irons are capable of being hardened. In the hardened, as quenched condition, the strength properties are materially altered. The ultimate breaking strength is substantially reduced. The stress strain curves undergo a marked change in character and in addition to showing a substantial reduction in total area the characteristic curvature almost completely disappears, the curve becoming practically truly proportional right up to the ultimate breaking stress with a complete absence of any sign of plasticity. The modulus of elasticity as determined in the manner laid down (in Air Board Specification 4K6) also undergoes a slight reduction. These changes are accompanied by a marked in-

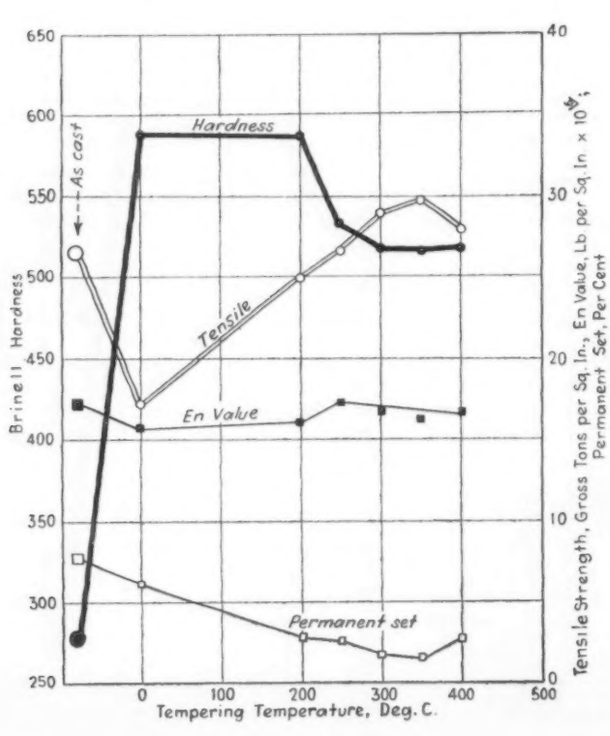
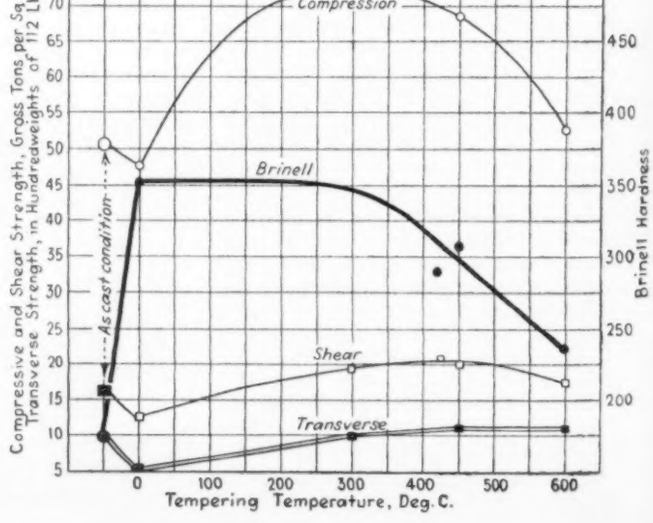

Hardness
As cast
Tensile
En Value
Permanent set
Brinell Hardness
Tensile Strength, Gross Tons per Sq. In., En Value, Lb per Sq. In. x 10³; Permanent Set, Per Cent
Tempering Temperature, Deg. C.

Fig. 1—Properties of cast iron after hardening and tempering (at left).

Fig. 2—Guillet's results replotted in English units (below).



# Heat Treatment

By J. E. HURST
Technical Director
Sheepbridge Stokes Centrifugal Castings Co., Ltd., Chesterfield, Sheffield, England

crease in hardness, the Brinell hardness being raised to within the neighborhood of 450 to 500, and as would be expected the microstructure changes from the pearlite to the martensitic character.

The effect of tempering treatments at progressively increasing temperatures on material in this hardened condition is profoundly interesting. Even at very low tempering of 100 deg. C. a change in the strength character is noticeable immediately. The ultimate breaking strength begins to recover rapidly. The stress strain curves increase in included area and appear to revert to the more normal type showing distinct curvature in the higher stress ranges approaching the ultimate breaking strength. In all cases examined so far the ultimate breaking strength reaches a value higher than that of the material in its original "as cast" condition and the stress strain curves become more satisfactory in that the initial portion shows conditions more nearly approaching those of true elasticity.

This improvement in the stress strain curves indicates an improvement in freedom of brittleness. The values of the included areas show that in magnitude the brittleness in the hardened and tempered condition is distinctly less than in the as cast material. This has been amply confirmed by repeated impact tests. These changes are accompanied by a slight reduction in the hardness value attained during hardening and the structure becomes more and more sorbitic in character. The modulus of elasticity has shown somewhat irregular variations but so far as investigation has gone, this, like the tensile strength, recovers in value to that of the original as cast material.

These effects of hardening and tempering are clearly summarized in diagram form in Fig. 1. Full experimental details are to be found in various papers* and these have been amply confirmed by other investigators, e.g., Everest, Guillet and his collaborators. The diagram Fig. 2 taken from Guillet's investigation in addition to adding confirmation is of interest in that it includes the compression and shear test results obtained from hardened and tempered specimens of material of the following composition: Total carbon, 3.35 per cent; silicon, 1.72 per cent; manganese, 1.13 per cent; nickel, 1.82 per cent; chromium, 0.08 per cent; sulphur, 0.06 per cent; phosphorus, 0.73 per cent. The specimens used were of bar form, the largest diameter being the compression test piece 16 mm. (⅝-in.) in diameter.

The test results given in the diagram confirm that hardening lowers all the mechanical properties excepting the hardness. Tempering is accompanied by a gradual recovery of these properties and in this particular material at a tempering temperature in the neighborhood of 300 deg. C. the mechanical properties are greater than those of the material in its original as cast condition.

It is of interest to note that these curves show maxima. At a tempering temperature of 300 deg. C. the ultimate strength in compression attains a maximum value, and at 425 to 500 deg. C. the ultimate strength in bending and the shear strength attain maximum values all of which are in excess of similar values for the as-cast material and beyond which the values fall until with the higher tempering temperatures the values again approach those of the original as-cast material. These observations amply confirm the earlier observations of the writer, and since this time fur-

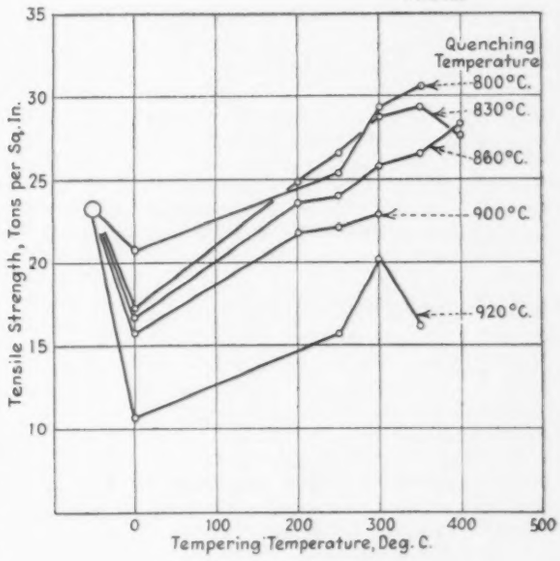



Fig. 4 — Effect of varying quenching temperature on tensile strength.

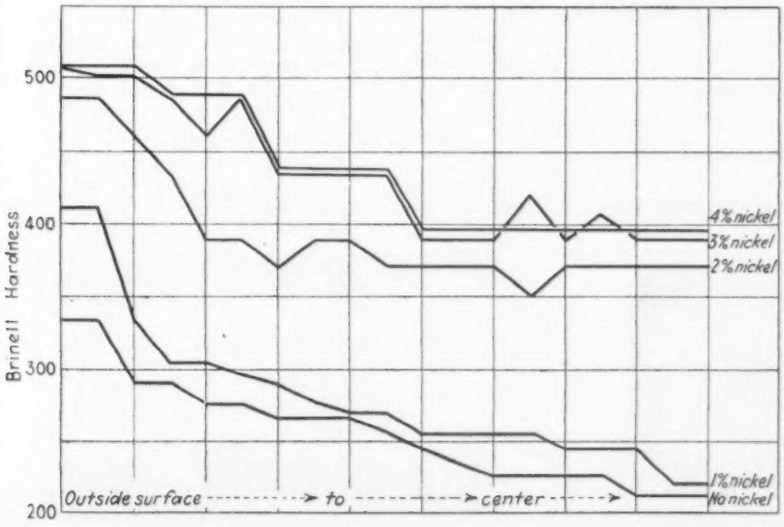



Fig. 3—Brinell hardness from outside edge to center of 4 in. diameter round bars after quenching in oil from 875 deg. C.

*Oil Hardening and Tempering Cast Iron, J. E. Hurst, Institution of British Foundrymen, November, 1930, December, 1931, and June, 1932.

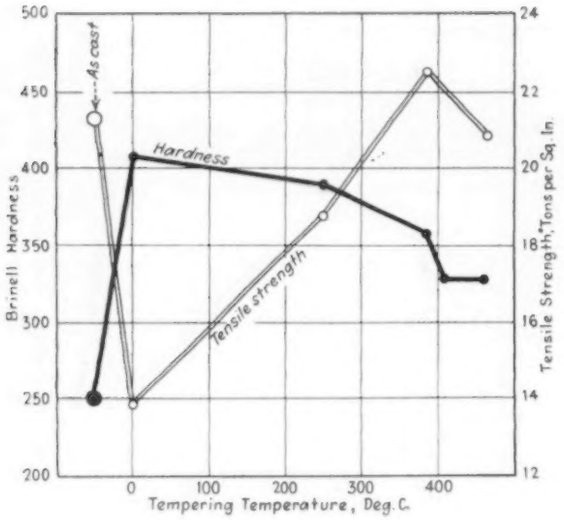



Fig. 5—Properties of nickel-chromium air-hardening cast iron.

ther experiments on numerous compositions of alloy cast iron yield results showing exactly similar characteristics.

The extent of the hardening effect obtained by oil quenching is measured in terms of the Brinell hardness and depth of penetration of the hardening effect. In plain unalloyed cast iron unless the sectional thickness of the material is small the extent of the hardening effect is not great. Some conception of the behavior of plain unalloyed cast iron from this point of view is conveyed by the experimental details given in Table I. The chemical composition of the material used was as follows:

Total carbon, 3.30 per cent; combined carbon, 0.62; graphite, 2.68; silicon, 2.3; manganese, 0.87; phosphorus, 0.71; nickel, nil; chromium, nil.

The Brinell hardness attained after quenching specimens ½-in. square and specimens ⅛ x ¼-in. in oil from a temperature of 875 deg. C. followed by tempering treatments at successively increasing temperatures are included in the table.

In the ½-in. square sections the degree of hardness attained is lower than in the smaller section and in addition experimental results from unalloyed cast iron show irregular hardness values. The presence of chromium appears to tend to improve the hardness figures obtained from the larger section specimens, but by far the greatest improvement appears to result from the presence of nickel.

The beneficial effect of nickel arises from two causes. Firstly, in the as-cast condition nickel has the effect of producing a more uniform hardness throughout the section, and, secondly, it materially increases both the degree of hardness obtained and the depth of penetration of the hardening effect. This is clearly shown by the diagram given in Fig. 3, which shows the Brinell hardness from the outside edge to the center of 4-in. diameter bars containing varying percentages of nickel up to 4 per cent. Similar experiments have been carried out on bars of various diameters and the following conclusions have been drawn.

(1). In material containing no nickel a maximum hardness at the outside surface in the neighborhood of 400 Brinell is obtained on bars about 1¾-in. diameter diminishing to about 300 in bars of 5½-in. diameter. The depth of penetration of this hardening effect is very small and even in the center of 1¾-in. diameter bars the hardness attained is very little above that of the as-cast material.

(2). With the addition of nickel in increasing quantities up to 3 per cent the maximum hardness obtained at the surface is increased. Increase in nickel to 4 per cent is not accompanied by any further increase in surface hardness which remains practically stationary at a value of 500 to 550 Brinell. This increase in hardness is affected in magnitude slightly by the size of the bar, being somewhat less in the larger diameter bars.

(3). The presence of nickel brings about a substantial improvement in the depth of penetration of the hardening effect. In a 1¾-in. diameter bar the presence of 1 per cent nickel enables the hardness to be increased from 255 to 275 by hardening, and with further nickel additions up to 4 per cent to the same size bar a value of 430 Brinell was reached. In larger bars, 4-in. diameter and upward, the effect of 1 per cent nickel was very small. With 2 per cent nickel, hardnesses of 375 and 325 were obtained at the center of 4 and 5½-in. diameter bars. The increase of nickel to 3 per cent and 4 per cent raised the hardness at the center only very slightly.

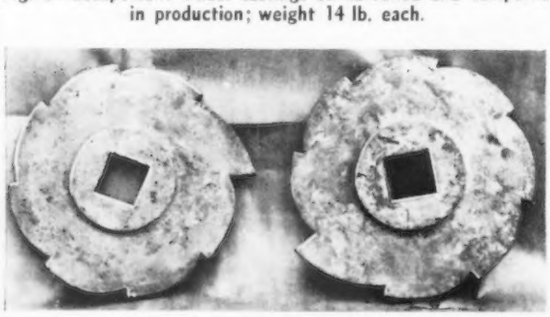
(4). Effective hardening of cast iron by quenching in oil can be obtained in sections up to 2-in. thick with the presence of 2 per cent nickel in an iron of the following composition: Total carbon, 3.70 per cent; combined carbon, 0.60 per cent; silicon, 1.95 per cent; manganese, 1.

**Table I—Hardening of Unalloyed Cast Iron**

| Condition | Brinell Hardness: Section ½ in. sq., 10 mm. ball 1000 kg. load | Section ¼ x ¼ in., 2 mm. ball |
|---|---|---|
| As cast | 202 | 230 |
| Hardened 875 deg. C. in oil | 390 | 518 |
| Tempered at 100 deg. C. | 390 | 534 |
| Tempered at 250 deg. C. | 390 | 488 |
| Tempered at 300 deg. C. | 357 | 488 |
| Tempered at 350 deg. C. | 327 | 460 |
| Tempered at 400 deg. C. | 327 | 412 |
| Tempered at 450 deg. C. | 312 | 401 |
| Tempered at 500 deg. C. | 276 | 320 |
| Tempered at 600 deg. C. | 268 | 291 |

Fig. 7—Valve parts, oil-hardened and tempered in production, weight 112 lb. each (at right).

Fig. 6—Escapement wheel castings oil-hardened and tempered in production; weight 14 lb. each.



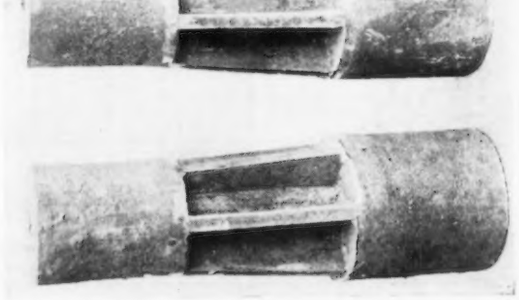


Fig. 8—Valve parts, oil-hardened and tempered in production; weight 28 lb. each.

Fig. 9—Valve parts, oil-hardened and tempered in production; weight 56 lb. each.

per cent; phosphorus, 0.50 per cent; chromium, 0.15 per cent.

Experiments have been conducted also with alloy cast irons of various other compositions and in all cases these have proved susceptible to oil hardening and tempering and the effect of this treatment on the physical and mechanical properties has proved to be similar in character to that described above.

A very important influence of oil hardening and tempering on cast iron is its influence on the permanent set properties. It is well known that cast iron when subjected to stress takes up permanent set and the magnitude of this permanent set for a given stress value tends to diminish according to the number of times the part is submitted to the action of the stress. The permanent set values after initial stressing of a number of specimens before and after various hardening and tempering treatments are recorded in Table II.

It will be observed that in this material the hardening treatment has brought about a substantial reduction in the amount of permanent set due to initial stressing. The stress value at which these determinations have been made corresponds to 14 tons (31,000 lb.) per sq. in., calculated on the basis of the tensile strength relationship given in B. S. I. specification 4K6. In the sample quenched from 830 deg. C. there are signs of a recovery in the permanent set value after tempering at the higher ranges of temperature. It has not yet been experimentally determined whether this recovery is characteristic, but it is clear that with suitable hardening and tempering treatment the permanent set can be considerably reduced and this is a property of valuable industrial importance.

These same experiments also serve to illustrate the influence of the hardening temperature on the results obtained. The diagram, Fig. 4, shows the tensile strength curves obtained from the same series of test pieces as described in Table II. The high hardening temperature of 920 deg. C. is accompanied by definitely inferior results both as to hardness and ultimate strength values in the hardened condition. The recovery of the ultimate strength value after tempering is likewise not nearly so good, although it is interesting to observe that the occurrence of a maximum in the strength curve still persists.

With a lower hardening temperature of 860 deg. C. a higher level of hardness and ultimate strength is maintained, and in this case the recovery to a maximum value occurs with a higher tempering temperature of 400 deg. C. With still lower quenching temperatures of 830 deg. C. and 800 deg. C. the higher hardness level is maintained and still higher ultimate strength values are reached, although the maximum occurs at a slightly lower tempering temperature of about 350 deg. C. in both cases. The lowest hardening temperature results in an exceptionally high recovery of ultimate strength from 26.5 to 30.5 tons (59,000 to 68,000 lb.) per sq. in., a gain of over 15 per cent. It thus appears, as in the case of steels, that the lowest hardening temperature possible is accompanied by the best results.

### Air Hardening Cast Iron

As in the case of steels certain elements, particularly nickel and chromium, have a marked influence on the critical speed of cooling necessary to produce hardening in cast iron. Alloy compositions of cast iron can be produced suitable for hardening by cooling in air from sufficiently high temperatures. The best results so far have been obtained with alloy cast irons of the nickel-chromium type. As in the case of oil hardened and tempered cast iron, the air hardening treatment is accompanied by a drop in the strength properties followed by a recovery to a maximum value on tempering. In fact so far as investigations have gone the response and behavior as regards the properties of suitable air hardening compositions appears to be exactly the same as the oil hardening materials. A typical example is shown by the results given in Fig. 5. These results were obtained from thin ring specimens, ½ x ½ in. section, of material of the following composition: Total carbon, 3.39 per cent; combined carbon, 0.59 per cent; Silicon, 2.19 per cent; manganese, 0.65 per cent; phosphorus, 0.46 per cent; nickel, 3.37 per cent, and chromium, 0.61 per cent.

The specimens were quenched in a blast of air from a temperature of 875 deg. C. and the hardness and strength curves illustrated are typical of the results obtained and illustrated already in Fig. 1.

### Hardening and Tempering Procedure

In general the procedure followed and the precautions to be taken in hardening and tempering cast iron are identical with those familiar in the heat treatment of steel parts. It would be anticipated in general that considerable difficulty would be experienced from cracking during the quenching treatments. It is probably the most astonishing discovery to find that in practice this is not the case.

Experience already gained with the hardening by quenching of quite complex castings has shown a remarkable freedom from cracking trouble in quenching and in fact this operation

*(Concluded on Page 67)*

**Table II—Permanent Set Values as Affected by Heat Treatment**

| No. | Treatment | Percentages After Quenching in Oil From: 920 Deg. C. | 860 Deg. C. | 830 Deg. C. | 800 Deg. C. |
|---|---|---|---|---|---|
| 1. | As cast | 7.95 | 7.95 | 7.95 | 7.95 |
| 2. | Quenched in oil | ... | 4.35 | 6.2 | 4.2 |
| 3. | Tempered at 200 deg. C | ... | 2.86 | 2.86 | ... |
| 4. | Tempered at 250 deg. C | 1.50 | 2.74 | 2.82 | 1.45 |
| 5. | Tempered at 300 deg. C | 1.52 | 2.9 | 1.64 | 1.43 |
| 6. | Tempered at 350 deg. C | 1.67 | 1.51 | 1.50 | 1.50 |
| 7. | Tempered at 400 deg. C | ... | 0.62 | 2.78 | ... |

Loading cars in an open pit iron ore mine.

Tapping a blast furnace.

The open hearth department.

Pouring ste

## A Century of P

SCENORAMAS, which afford color, motion and three-dimensions, are effectively used by the subsidiary manufacturing companies of the United States Steel Corpn. at "A Century of Progress" to depict in five scenes the romance of steel from ore mine to finished products.

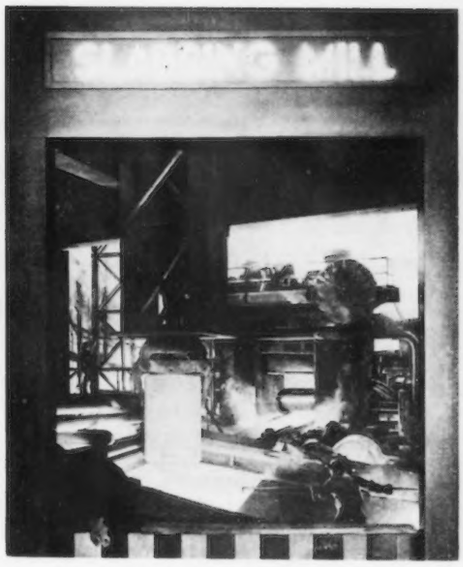
The first of these shows an open pit ore mine in which is shown in operation a miniature of an electric shovel which scoops up 20 tons of ore

at a
mo
an
sho
for

# The Romance of Steel

THE spectacle of a Bessemer converter pouring its white-hot contents amid flames, sparks and smoke forms the major display of the steel exhibit of the United States Steel Corpn. at the Century of Progress, Chicago. At regular intervals lights in the hall are dimmed and the converter high above the heads of spectators begins to blow. It slowly tips outward and discharges its contents, at which time the surrounding features of this exhibit are lighted by a red glow as if molten metal were the source of the light. Grouped around the converter are realistic and exactly proportioned models of ocean liners, automobiles, steel bridges, skyscrapers, locomotives, machines and various other kinds of products made from steel.

Pouring steel into ingot molds.

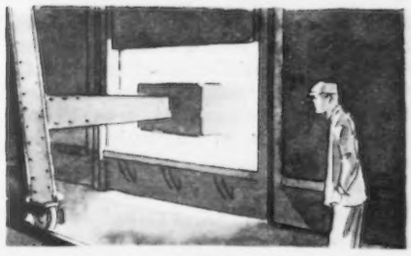


Charging soaking pits, and rolling slabs.

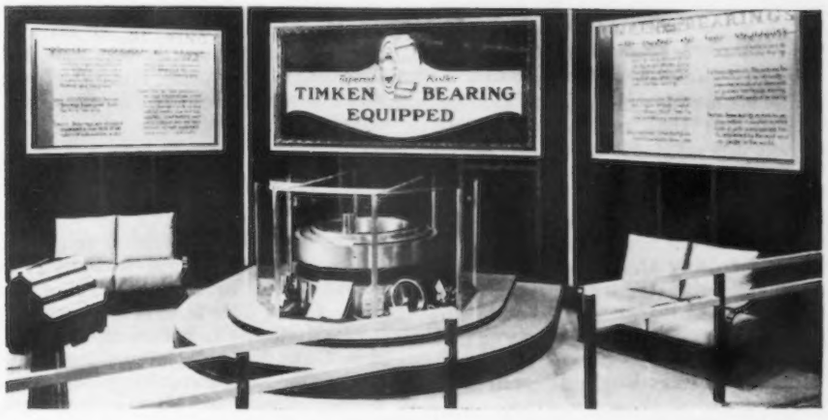
Continuous plate mill in operation.

## of Progress

at a bite. The next scenorama shows a blast furnace at the time of tapping, motion being shown by the flow of "molten" metal. The third view is in an open hearth department where the pouring of hot metal is realistically shown. Another scene is that of a slabbing mill with soaking pits in the foreground. Here the slab passes back and forth between the rolls. The last of the series is a continuous plate mill in operation.



# Smoothing the Path of Steel

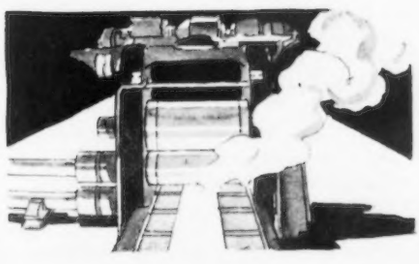



THE feature attraction in the Timken Roller Bearing exhibit at the Century of Progress is the largest anti-friction bearing ever made. This bearing weighs 3½ tons and has a capacity of 8,000,000 lb. It is designed for use on the roll necks of steel mills.

The increasing interest in bearings for railroad cars and locomotives is also drawing particular attention to the display of a Timken railroad bearing which is included in this exhibit.

The newest product of the company, the Timken rock bit, is also on display. Although this bit has only been on the market for a short time, it has already effected drastic economies in drilling costs on mining, quarrying and contracting operations all over the country, it is stated. It replaces the old method of forging a bit on the end of the drill steel. The Timken bit is attached to the drill steel by a thread, which makes it a matter of seconds to remove it and throw it away when it becomes dull. This eliminates resharpening costs, which have always been a major part of drilling expense.

This exhibit is located in the Travel and Transport Building adjacent to the entrance to the balcony overlooking the dome.



# Code Discussion Features Gear Association Meeting

DISCUSSION of the Code of Fair Competition for the gear manufacturing industry, as revised for public hearing, predominated the proceedings of the sixteenth semi-annual meeting of the American Gear Manufacturers Association, held at the Penn-Lincoln Hotel, Wilkinsburg, Pa., Oct. 17-18. There were two technical contributions of importance, however, and also timely addresses relating to uniform cost accounting methods and merchandising of gears. J. C. McQuiston, secretary-manager of the association, earned a vote of thanks for his arrangement of the meeting.

E. W. Miller, chief engineer, Fellows Gear Shaper Co., Springfield, Vt., president of the A. G. M. A., presided at all sessions except those devoted to reading and discussion of the code, which were under the chairmanship of H. H. Kerr, president, Boston Gear Works, Inc., North Quincy, Mass.

The basic code comprises 10 articles. It provides that no employer shall engage any employee in the processing of products of the industry, and in labor operations directly incident thereto, in excess of 40 hours per week. The minimum wage that shall be paid to any shop employee is 40c an hour, with the exception of apprentices and learners other than apprentices.

### Clause Covers Buying Practices

In addition to acts common to all codes, the article on Unfair Practices contains one, designated as item g, which refers to the purchasing department. This states that "to misrepresent, directly or indirectly, the offer of one supplier to a competing supplier in conducting negotiations as purchasers of materials for use in gear manufacture" constitutes unfair methods of competition.

Also, in the present code, in the section relating to definitions (Article II), the term industry is defined to mean "those engaged in the manufacture for sale of cut gears, speed reducers (whether manufactured with or without motor), cut sprockets and other similar power transmission media." The term "cut" has been inserted in order more definitely to separate the A. G. M. A. code from transmission and other codes covering cast tooth gears and sprockets.

After reading and discussion of each article, it was voted that the basic code be approved as read for presentation to the Administration, subject to such modifications as may be required after conference with the Deputy or his assistants.

It was resolved that the following members constitute the committee to present the A. G. M. A. code to the Administration of the NRA and to attend separately or collectively such meetings as are called by the Administration, and to attend hearings called for review of the A. G. M. A. code. They are: H. H. Kerr, Boston Gear Works, Inc.; E. S. Sawtelle, Tool Steel Gear & Pinion Co., Cincinnati; Howard Dingle, Cleveland Worm & Gear Co., G. L. Markland, Jr., Philadelphia Gear Works, F. H. Fowler, Foote Bros. Gear & Machine Co., Chicago; L. R. Botsai, Nuttall Works, Westinghouse Electric & Mfg. Co., and J. C. McQuiston.

### Committee on Code Authority

It was voted that the following six members of the association constitute the committee on Code Authority, as provided for in Article VII of the Basic Code: H. H. Kerr, New England; R. C. Ball, president Philadelphia Gear Works, Metropolitan New York; R. Ferguson, Ferguson Gear Works, Gastonia, N. C., Southern; Howard Dingle, Central; F. H. Fowler, Western; and F. B. Drake, Johnson Gear Co., Berkeley, Cal., Pacific Coast.

At the opening session, E. S. Sawtelle, vice-president, Tool Steel Gear & Pinion Co., Cincinnati, and G. L. Markland, Jr., chairman of the board, Philadelphia Gear Works, spoke briefly on the proposed code. The latter in speaking on "Presentation of a Code—Independently or With a Group," pointed out that the gear industry is practically the maintenance shop of all industry—since machinery used in all industries employs gears; also that since industry in general cannot function without gears, gear manufacture is a basic industry. A separate code would be desirable both in unifying the industry and making it articulate.

### Commends Firm Bidding

In an address on "Business Ethics and Fair Trade Practices," Howard Dingle, president, Cleveland Worm & Gear Co., Cleveland, said that in his opinion the evil of cutting prices is about 75 per cent due to weak selling, and 25 per cent due to unscrupulous buying. "If we permit or encourage our salesmen to knock off 5 or 10 percent whenever the buyer says that the price is too high, we can hardly blame the buyer for trying it on. And so in the A. G. M. A. code we have very wisely declared it to be our policy to stand for firm bidding," he said.

Regarding unscrupulous buyers, Mr. Dingle said: "Isn't it time for the large corporations to rate the value of a buyer or purchasing agent on his ability to know the market and to determine values rather than on the amount he can save his company per year by what he has chiseled out of the weak salesmen?"

Of the NRA, Mr. Dingle said, in part, "I believe that we will have the NRA or its equivalent for a long time to come. If it does no more than get business men together to solve the problem of doing what they really want to do, namely, conduct their business on a fair and square basis so that the other fellow, be he workman or competitor, can make a little money too, it will be worth the effort it is costing us."

### Sound Costing Methods Necessary

THE importance of sound costing principles in following through on the NRA was emphasized by Roscoe Seybold, comptroller, Westinghouse Electric & Mfg. Co., East Pittsburgh, in a timely address on "The NRA and Cost Accounting."

In reference to the National Recovery Act, Mr. Seybold said: "A few astute business men foresee that the important part of what is happening today is merely that the industries

are being organized for self-government and for cooperation with all industries to meet national needs. Those who accept this attitude are going to get much good from the present situation."

It was pointed out that, insofar as industry is concerned, each code has its liabilities and its assets. The liabilities are the minimum wage, maximum hours of work, and the labor clause; the assets are the possibilities of eliminating unfair competition, uniform cost and accounting practices, and the possible control of manufacturing capacity. "You are or will be forced to meet the liability clauses," said Mr. Seybold, "but it is up to industry and trade associations to develop the maximum good from the assets."

One aspect of these codes said not to be generally understood is that when adopted and signed by the President, a code becomes a National law. A violation of one of the elements of the code is subject to penalty.

Most codes specify that no sales shall be made below cost. To secure maximum benefit from this code asset, there must be uniformity of accounting and cost accounting practices within the industry, he said.

### Must Talk In Same Terms In Discussing Cost Components

It was pointed out that there may be difference of individual opinion as to the definition of expense items or what is included in an expense item. It is the purpose of uniform accounting to establish definitions of expense items and to arrange similar methods of handling these items. "If we are to capitalize the assets available from the code, we must all talk in the same terms when discussing costs," said Mr. Seybold.

In outlining some of the debatable items, he stated that costs should not include interest on investment in plant, equipment and work in progress; the purpose of profits is to secure the return on investment. Costs should include depreciation on plant and equipment. Maintenance expense is another item requiring careful consideration. Is this an expense item in overhead, or is it chargeable against depreciation reserve? These and other questions were recited to point out some of the classifications of expense items that ordinarily are subjects of discussion in the development of a cost formula.

In conclusion, Mr. Seybold said: "The NRA has come to our assistance as an aid in regulating and administering industry. It has many apparent assets, but we must do our part to usefully employ them."

Discussion following Mr. Seybold's address concerned practical methods of assuring uniform cost accounting methods. E. S. Sawtelle, chairman of the association's commercial standards committee, favored plant visits

by a cost accountant familiar with the business side of the gear industry. This it was held would immediately put all manufacturers in a position to talk the same language concerning cost components of gears, although not unifying sales prices or eliminating the advantage of any manufacturer having specialized equipment or facilities, Mr. Sawtelle's suggestion met with considerable favor.

Other suggestions included the use of a cost manual, such as adopted by the A. G. M. A., for uniform costing. No action was taken by the association on any specific proposal, but it was apparent that Mr. Seybold's address and the active discussion served somewhat to crystallize the entire problem, especially in view of code requirements as to "no sales below costs."

### Eleven New Member Companies

ELEVEN companies were admitted to membership in the association. These, with their executive representatives, are as follows: Chicago Gear Works, Chicago, J. J. Quinn; Cleveland Worm & Gear Co., Cleveland, Howard Dingle; De Laval Steam Turbine Co., Trenton, N. J., J. T. Hertzler; Ganschow Gear Co., Chicago, Charles Goedke; Illinois Gear & Machine Co., Chicago, V. P. Reilly; Union Gear & Machine Co., Boston, C. L. Pratt; Western Gear Works, Seattle, T. J. Bannon; Globe Engineering Co., Philadelphia, F. H. Johnston; Earle Gear & Machine Co., Philadelphia, E. P. Earle; Charles Bond Co., Philadelphia, Charles Bond; and the Synthane Corpn., Oaks, Pa., R. R. Titus.

A proposed amendment to the constitution to include "affiliate" company membership was voted. This embraces companies engaged in the manufacture and marketing of gears for machinery, maintenance or experimental purposes, and eligibility is confined to companies having annual gross sales of $25,000 or less over a period of five years.

## Gear Merchandising Discussed

MERCHANDISING of gears, speed reducers and allied products was discussed in a comprehensive but succinct address by Francis A. Emmons, general sales manager, Foote Bros. Gear & Machine Co., Chicago.

In the wide diversity of gear uses and users lies the basic soundness of

the gear industry, Mr. Emmons pointed out. Although gear and reducer volume dropped to an unprecedented level during the depression, the gear industry has operated at a percentage of capacity considerably higher than the industrial average.

Mr. Emmons subdivided his subject into market analysis, advertising, sales promotion, selling, and service. In discussing market analysis he pointed out that the Statistical Abstract of the United States is a veritable gold mine of valuable data, and that the Department of Commerce supplies industrial market statistics of amazing completeness. Publishers of trade publications are also sources of marketing data.

A number of basic facts learned from market analysis was listed. Based on figures compiled in 1928, the total gear market, exclusive of speed reducers, for general industrial, coal and metal mining, and transportation fields was said to approximate $42,000,000. The study also showed that in 1926 there were 36,700 gear-cutting machines in operation in the United States. Of these, 12,500 or about one-third are in plants manufacturing gears for sale, and two-thirds in plants making gears for their own use.

Every good merchandising plan must contemplate some form of advertising, said Mr. Emmons, the amount and kind being dependent upon funds available, and whether the business is to be National or local in scope. From a survey made by the National Industrial Advertising Associates in 1932, 2½ to 3 per cent of gross sales was said to be considered a fair average for advertising expense. In this the ratio of publication advertising (including art work and engravings) was given as 46 per cent.

Advertising copy, it was held, should lay greatest stress on what the product will do for the user. It was pointed out that every product passes through a pioneering stage, a competitive stage and a retentive stage. Gears and ordinary speed reducers, for example, are in the competitive stage; motorized reducers are still in the pioneering stage. Advertising copy should be written with this in mind, it was held.

General publicity articles of an engineering nature published in trade journals are of great advantage when the information is authoritative and unbiased, and not obviously an attempt to use the editorial columns for advertising, said Mr. Emmons.

### Group Advertising Suggestion Being Acted Upon

That as an association the A.G.M.A. had overlooked the advantage of cooperative advertising, was an opinion expressed by the speaker. Such advertising, he held, might be used to broaden and promote the market for

gears and speed reducers in such a way as to tremendously benefit the association as a whole, as well as its individual members.

"For instance, why can we not pool together and undertake a series of advertisements in trade publications to sell the industrial plant on the advantages of buying gears from experts and specialists, instead of trying to make their own, with heavy investments in gear-cutting machines and losses due to idle machine hours, supervision, etc.?" said Mr. Emmons. "This advertising could be handled under the name of the A.G.M.A., listing the individual manufacturers subscribing to the advertising fund, and each advertisement could emphasize that high quality is to be found in A.G.M.A. members' products."

At the conclusion of the address, J. C. McQuiston, secretary-manager of the association, and others spoke in favor of the group advertising suggestion, and it was voted to appoint a committee to investigate the matter. This committee includes F. F. Kerr, president, Boston Gear Works, Inc., chairman; H. O. James, D. O. James Mfg. Co., Chicago, and G. L. Markland, Jr., chairman of the board, Philadelphia Gear Works.

Mr. Emmons' paper also covered sales promotion activities. These included scanning of publications for notices of new industrial building projects, extensions and improvements, and keeping in touch with new developments in processes, machines and other equipment.

### Good Service Important Under Present Conditions

Planning of the selling organization, including location of sales offices, selection, training and compensation of salesmen, was also discussed. Service was emphasized as a definite function of merchandising. Under present conditions good customer service is more important than ever, said Mr. Emmons. "Prices will be stabilized under the NRA, we hope, and we must sell our products purely on quality and service. Stocks are depleted to the lowest ebb, and many machines have been partly dismantled to keep others in service. Necessary repairs and replacements have been deferred to the last possible moment. When it is finally decided to go ahead, the customer demands almost impossible deliveries. The company that takes orders and falls down on its promises runs a big chance of being wiped off the list for the future. It will pay us to maintain our delivery standards and prompt service in handling correspondence, even though it costs us money for extra help," he said.

### Develops Equation for Computing Capacity of Speed Reducer Gears

TECHNICAL standardization committee reports submitted at this meeting included two important ones, which were later adopted as A.G.M.A. recommended practice. One was a rational gear equation for computing the capacity of helical and spur speed-reducer gears over a wide range of speed or ratio, and the other was a formula for standardized worm geared speed reducer ratings. Both were presented by E. P. Connell, Falk Corpn., Milwaukee, chairman of the speed reducer section.

The equation for helical and spur gears was presented in the form of a paper by W. P. Schmitter and G. P. Maurer of the Falk Corpn. It takes into account the stress occurring at point of contact due to elastic deformation, and makes provision for exact determinations of contact lengths and tooth curvatures in the plane of contact. Eight factors are used, representing the effect of diameter, face width, materials, velocity ratio, tooth curvature as affected by pressure and helical angles, and contact length. The paper was highly commended.

The formula and discussion in connection with the standardized worm geared speed reducer ratings were for worm gearing for power transmission only, with the threads formed integral with the shaft.

A. A. Ross, engineer, General Electric Co., West Lynn, Mass., chairman of the A.G.M.A. general standardization committee, reported progress in the various technical standardization projects.

A report of a meeting with representatives of several chain manufacturers to discuss uniform specifications and list prices on sprockets was made by J. Harper Jackson, secretary, Pittsburgh Gear & Machine Co. With the ironing out of a few difficulties, it is expected that these specifications and lists will be in shape to propose for use by the A.G.M.A.

B. F. Waterman, engineer, Brown & Sharpe Mfg. Co., Providence, R. I., and A.G.M.A. representative and chairman of the A.S.A. sectional committee on the standardization of gears, reported that the proposed American recommended practice on gear materials and blanks has been approved by the A.S.A. Letter symbols for use in gear computations, being worked up by the sectional committee on Scientific and Engineering Symbols and Abbreviations, will be forwarded to the A.G.M.A. nomenclature committee. The association's recommended practice relating to the inspection of gears will be passed and be printed.

The A.G.M.A. library committee, headed by M. T. Schumb, engineer, Boston Gear Works, Inc., is sending the entire list of the association's recommended practices and data sheets to the various committees for revisions. Copies of the revised material will be sold at a nominal price.

Several members of the association visited the plants of the Allegheny Steel Co., at Brackenridge, and the American Sheet & Tin Plate Co., at Vandergrift, Pa., at the invitation of the Association of Iron and Steel Electrical Engineers, whose convention was held simultaneously at the William Penn Hotel, Pittsburgh.

## Committee Will Study Unfair Trade Practices

A NEW committee of business leaders from various parts of the country has been selected by Gerard Swope, Chairman of the Business Advisory and Planning Council for the Department of Commerce, to focus their experience on the problems of unfair trade practices in order to organize an attack on the economic waste now handicapping business as a result of such practices.

The new committee, Mr. Swope announced, to be known as "Committee on Unfair Trade Practices in Production and Distribution," will be headed by Lincoln Filene, Treasurer and Chairman of the Board, William Filene Sons Co., Boston, who has long been identified with constructive efforts for furthering progress along these lines.

Other members of the committee include: Everett G. Griggs, Chairman of the Board, St. Paul and Tacoma Lumber Co., Tacoma, Wash.; Lucius Eastman, President, Hills Bros., New York; Dr. Paul F. Nystrom, professor of marketing, Columbia University, New York; L. D. H. Weld, Director of Research, McCann-Erickson, Inc., New York; Roy Dickinson, President, The Printers' Ink Publications, New York City; Morris E. Leeds, President, Leeds & Northrup Co., Philadelphia. Additional members of the committee are to be appointed.

According to Mr. Filene, Committee Chairman, unfair business practices are of two kinds—first, those that occur between competitors; second, those that occur between a buyer and a seller. The work of the new committee, Mr. Filene says, will at first probably be confined largely to the latter field, and, since this field has not hitherto been covered, will not duplicate existing activities of other agencies. Such efforts as have been made have been for the most part incomplete and not uniform. Few attempts have been made to touch the much closer and more continuous relationship between the buyer and the seller, the producer and the distributer. Yet in the opinion of Mr. Filene it is the unfair practices that have crept in and multiplied in this joint relationship that have created wastes amounting to many millions of dollars annually.

# Fabricators Review Steel House Developments Here and Abroad

STEEL house construction as practiced in France, Germany and the United States was reviewed by the American Institute of Steel Construction at its eleventh annual convention held at Chicago, Oct. 19-21. As a general rule it was held that private homes will be built in the long run according to the special wishes of the owner and accordingly will not be of the mass-production type. Steel construction may be slow in entering rural sections because of competition of local materials, whereas the mass-production steel house will play an important part in suburban and industrial settlements.

Although not opposed to efforts for mass-production and the utilization of standardized parts, F. T. Llewellyn, United States Steel Corpn., believes that the future development of steel in this field will be found in houses of individual, non-standardized design and that architects, builders, and local fabricating shops are the natural and most promising avenues of exploitation.

Forty years ago in the field of tier buildings steel makers adopted the policy of making available a suitable variety of rolled steel sections, with simple rules and tables to facilitate their use, thereby encouraging a large number of architects and engineers to make such application of them as the individual character of each structure dictated. While the application of this policy to residences is not as sensational as some that have been offered, it has the merit of making available for immediate use by a large number of people the results of an intensive study of the present problem based on experience accumulated over many years in other fields.

### Survey of the Steel Corporation

Last year a survey was made by the United States Steel Corpn. for the purpose of investigating the demand for steel in residence construction. Nearly 100 different systems of construction were studied, and a number of the residences built in accordance with these systems were inspected. The following conclusions were indicated:

1. There exists a widespread interest in steel framed residences. The principal demand is for small one and two family houses of individual design.

2. Steel can be advantageously used in the construction of residences of any architectural style or arrangement to provide a frame that will not shrink, is inherently non-combustible, sanitary and rigid, resists the destructive attack of insects, and can readily be made permanent.

3. Certain new practices can be employed with safety and economy in the design of the steel framework for small residences along lines not contemplated in current engineering handbooks.

4. With the aid of suitable information the steel framework can be designed by architects as readily as in the case of older forms of construction.

5. The details of the steelwork can be developed to advantage in cooperation with the personnel of a fabricating shop located in the vicinity of each job.

6. The fabrication and erection requirements are simple and are well suited to the equipment of the smaller structural or sheet material shops.

### Steel Houses in Germany

Buildings of special interest to the German steel industry are the settlements bordering on the outskirts of cities and the homes built by private owners, according to Otto Von Halem, Duesseldorf. In rural settlements no steel has been used so far, because it is hard to replace the local building material far out in the country and there is still a question of the suitability, especially of steel walls, for the construction of stables and stalls. The use of steel for rural settlements is therefore confined to sheet steel roofs, and on larger farms to the construction of barns, especially field barns which are usually designed as steel pipe column barns with sheet steel roofs, which have proved to be very popular.

Settlements at the outskirts of cities are from a technical point of view the ones most suited to multiple production methods because they consist of separate houses which are standardized and set up in large numbers at a time. When it comes to the private home, this is always built according to the special wishes of the owner and according to the size and nature of the lot.

The Zollinger construction is very inexpensive, consisting of a light frame for walls made from sheet steel and metal lath. The floors and the roof are similarly constructed. Besides these walls with a reinforced outer finish, the wall which consists of large size panels seems to be the most economical type; for the outer layer, steel sheets as well as Lignat and Eternite panels, consisting of asbestos with cement, etc., have been used.

### Several Types Popular

Another type of residence employs columns which support an uncemented glass roof. The outer layer of the wall comprises asbestos panels, which are fastened to the columns by means of steel strips, and the inner (insulating) layer consists of panels made of wooden fibers, so-called Tekton panels.

So far the most popular design for private homes is the Boehler System, where corrugated or other sheet steel is used as part of the wall. The ceiling is made in a similar manner. This construction has also been used for one-story buildings for the settlements on the city outskirts. It competes economically with the low prices of other types of construction.

The steel-lamellar construction, however, has met with the greatest success for settlements as well as for small one-story private homes and seems so far to be the most suitable kind of construction for these types of houses. Approximately 1500 residences of this type have been erected in Germany.

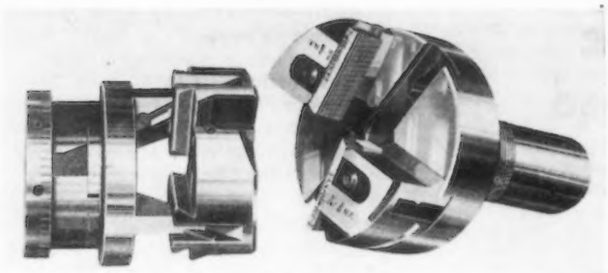
The standard building element consists of a steel-lamella, about ⅛ in. thick, 45½ in. wide and 90½ in. or 9 ft. high which is flanged on all sides. The flanges, which connect the individual lamella to each other, serve as supporting and stiffening ribs for the walls. The bracing of the walls against horizontal forces is made at the bottom by flats which together with the lamella are fastened to the masonry or reinforced concrete base by means of foundation bolts; also at the top there are flats, angles or protruding cornice plates. The insulation in this case consists of panels of cork, heraclith, Tekton, timber or cane fibre, seaweed mattresses, hollow tile, etc., which are installed after the steel-lamella or plates have been set up. In order to simplify the erection, it is aimed to make the individual wall sections ready in the shop, with insulation, windows, doors, etc., set in, ready for erection at the building site.

The steel-skin system, Ferroterm, is characterized by the thinness of the sheets (0.6 to 0.75 mm., or 0.024 to 0.03 in.). In this case the necessary rigidity is obtained by folding the sheet several times.

### Light Steel Construction in France

Houses of pre-fabricated units of steel which permit quick assemblage are rejuvenating the house-building industry of France, according to Col. Louis Icre, Paris, director, l'Office Technique pour l'Utilization de l'Acier. In France a saving of 2 to 3 per cent in the cost will often influence the use of materials other than steel. However, speed of steel construction resulting in quicker return of capital invested and a saving in labor is rapidly being more fully appreciated.

To summarize the French viewpoint: "Standard steel sections scientifically used will revolutionize the building industry and open up a new and most important outlet for steel. The technical knowledge necessary for this great improvement is making good progress. Considerable educational work will be necessary to popularize these new construction methods, but the final result of this campaign leaves room for no doubt if it is energetically carried out."



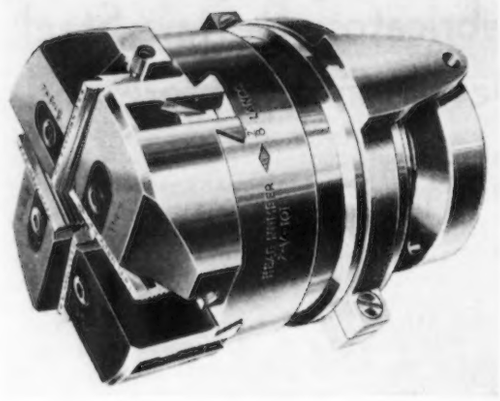


Fig. 1 (above): New Landis die head dismantled to show component parts. These heads are hardened and ground throughout, and represent a departure from the company's former designs. Fig. 2 (at right): The new Lanco head is for hand-operated threading machines of the bolt-cutter type. Opening and closing of this and the Landex head is through a yoke.

# Introduces New Series of Hardened and Ground Die Heads

THE Landis Machine Co., Waynesboro, Pa., has developed a new series of die heads consisting of three distinct types, made of alloy steel, hardened and precision ground throughout. This series supplements, but does not supersede, the company's present line of heads. Simplicity of design and a rigidity that practically eliminates wear of working parts are features emphasized. The tools are intended both for heavy-duty production and for work that must be held to extremely close thread limits.

Types and sizes are as follows: ⅝ and ⅞-in. Lanco heads, the type V, for hand-operated threading machines; the ⅝, ⅞ and 1¼-in. Landex heads, the type L, for automatic screw machines; and the ⅝, ⅞ and 1¼-in. Landmatic heads, the type H, for turret lathes.

The heads represent a departure from conventional Landis design, but the chasers are the same as and are interchangeable with those of the Lanco, Landex, or Landmatic heads now in use.

Chaser holders are mounted on the face of the head body. They operate in dovetail slots, and have an unusually wide bearing surface consisting of the combined areas of the base and the dovetail section of the chaser holders. The driving member of the die heads, that is, the shank or attaching flange, is attached directly to the head body. It is pointed out that the drive is, therefore, direct, and no torsional strains can be transmitted to the head-adjusting or locking mechanisms, or to the head-opening and closing mechanisms.

The head is opened by moving the chaser holders away from the work. From Fig. 1 it may be seen that the position of the chaser holders is controlled by prongs which are an integral part of the closing ring. The supporting surfaces of these prongs act as cams and, as a key in the chaser holder slot fits into a keyway in the prong, the action of the chaser holders, both to and from the closed or locked position, is controlled positively. Movement of the closing ring is actuated by spring pressure acting directly upon the closing ring itself. This design is emphasized as assuring uniform and unusually reliable head opening.

Movement of the closing ring is controlled by a locking ring. Fig. 1 shows the locking ring in the open position of the die head. In closing the die head, the locking ring is rotated on the head body and, through tapered surfaces, it forces the closing ring forward. Four off-set surfaces on the front of the locking ring hold the closing ring in the locked position.

Opening and closing of the Lanco head, the type V, Fig. 2, and the Landex head, type L, Fig. 3, is obtained through a yoke. The Landmatic head, type H, Fig. 4, may be opened and closed either automatically or by hand.

The mechanism for adjusting the die heads to size consists of a threaded collar which screws on to the head body and is in direct contact with the locking ring. The adjusting ring may be locked in position after the size adjustment has been made. The ring is graduated and each division gives an adjustment of exactly 0.001 in. in the pitch diameter of the thread. The graduations are widely spaced so

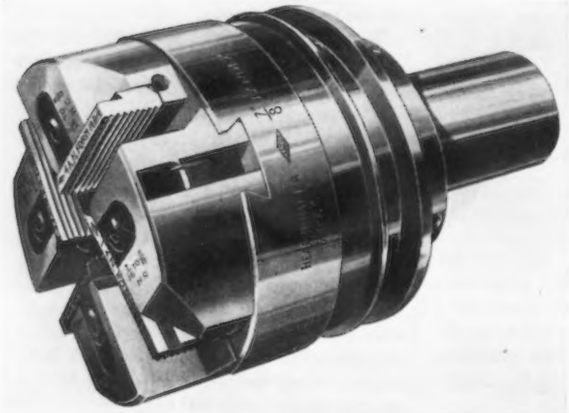
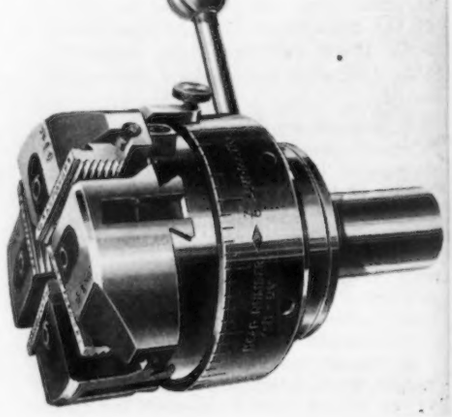


Fig. 3 (at left): The Landex die head is offered for automatic screw machines. Fig. 4: Opening and closing of the Landmatic head at right, which is for turret lathes, may be automatic or by hand. Chasers on all die heads of the new series are interchangeable with those of Lanco, Landex and Landmatic heads now in use.



that adjustments as fine as 0.00025 in. are possible.

A comparatively short chaser clamp, operated by a single hollow head screw, holds the chaser in the holder. The clamp seats in a socket with a tapered bottom. When it is drawn down, the clamping action is toward the base and back of the holder, thus seating the chaser firmly. A lip extending along the top of the chaser holder, and protruding slightly beyond the front of the clamp, supports the cutting edge of the chaser and prevents the chaser from being thrown out of alinement.

The seat in the chaser holder is ground at an angle to the face of the die head. When the chaser is clamped in the holder, it is inclined at an angle to the work. This control of the helix angle in the chaser holder instead of in the chaser is said to have many advantages, such as simplifying the setting and grinding of chasers, permitting chaser interchangeability, and making possible the use of chasers of a given pitch for threading any diameter of work.

By using suitable chaser holders, the die heads can be employed for cutting both right and left-hand threads. The same chasers are used for right and left-hand work by grinding the cutting angles at both ends of the chasers. For setting the chasers to the correct cutting position a chaser setting gage, similar to a straight-edge, is employed.

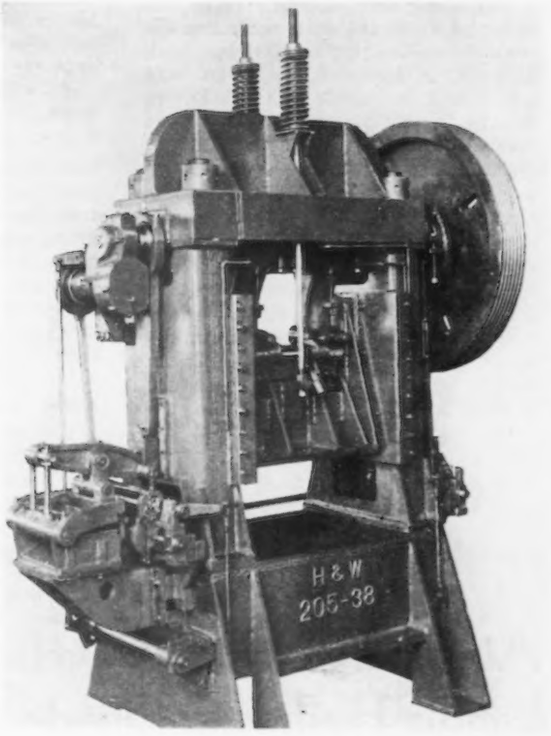
# Welded-Steel Presses Equipped with Dieing-Machine Type Automatic Feeds

THE Henry & Wright Mfg. Co., Hartford, Conn., has introduced a line of welded steel presses embodying automatic features typical of the company's dieing machine.

The machines are of tie-rod construction and are similar in general design to the company's standard welded-steel straight-sided presses. Bed, uprights, crown and slide are made from special welding-quality steel, normalized and annealed before machining to release stresses. The design of these members is claimed to be such as to reduce deflection to minimum and to provide high resistance to fatigue.

Crankshafts are made from hammered alloy-steel forgings, heat-treated before finish turning. They are mounted in removable hard bronze bushings, and the crankpin bearings are also bronze bushed. Spring counterbalanced slide, positive clutch, releasing brake, together with single and continuous operating lever, are standard equipment.

Automatic double-roll feeds of the type developed for the Henry & Wright dieing machine [an automatic high-speed press having the crankshaft below bed] are included. These feeds are designed to assure accurate action at high speeds. The hardened rolls are ground to close limits, and are of a diameter that assures ample contacting surfaces. They are actuated through a ratchet and pawl mechanism; the outgoing rolls are driven from the crankshaft through helical gears and driving rack, and the incoming rolls are driven in synchronism with the outgoing rolls by means of a connecting rack. Feed pitch is adjustable, and timing of roll feed action with relation to crankshaft rotation can be varied readily. A cam-actuated roll release mechanism is also included.




Automatic double-roll feeds of the type developed for the H & W dieing machine are employed. The roll feed of this size press will handle material up to 12½ in. in width.

It is not claimed that these new presses will produce results equal to those of the company's dieing machine, but it is stated that the extreme rigidity of the specially-designed steel frames, together with the precision roll feeds, makes possible use of progressive dies in the high-speed production of close limit stampings.

The particular press illustrated has a 5-in. crankshaft and measures 38 in. between the uprights. Roll feeds of this press handle material up to 12½ in. in width, feeds having maximum pitch of 8½ in. An automatic heavy-duty adjustable scrap-cutter is included and provision is made for V-belt drive, as shown.

## New High-Frequency Electric Grinder

COOL running motor, streamline ventilation system, and mounting of the stator on insulating pads within the motor housing are features of a new portable high-frequency electric grinder recently brought out by the Buckeye Portable Tool Co., Dayton, Ohio. These, it is stated, result in an extremely low temperature rise in operation and thereby increase the efficiency of the tool. This grinder, designated as the Hercules No. 61, is built in two speeds, namely, 3800 r.p.m. for use with 6-in. vitrified emery wheels, and 5400 r.p.m. for use with 6-in. elastic bonded emery wheels. The 3800 r.p.m. tool can also be used with 8-in. elastic bonded wheels.

# New Baird Multiple Transfer Automatic Presses

A LINE of multiple transfer presses has been designed by the Baird Machine Co., Bridgeport, Conn., for conditions requiring transfer of the work to several positions after blanking, for the purpose of piercing, forming one or more times, lettering, embossing and the like. Six standard sizes, for maximum widths of metal from 1½ to 6 in., are made.

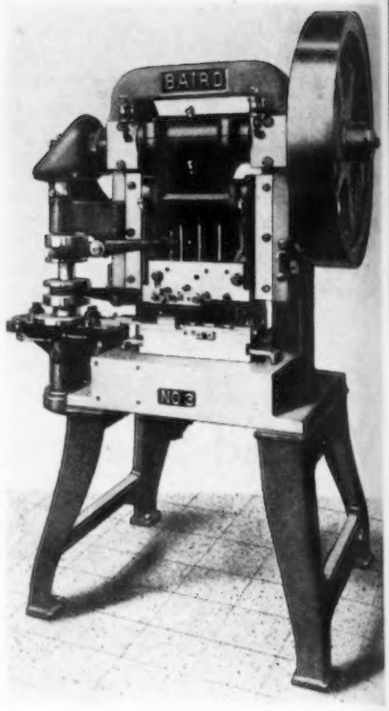
The press automatically feeds the material from the coil, performs operations preliminary to blanking, such as piercing, lettering, etc., then cuts and places the blank in the transfer fingers, transfers the work to the several other tool stations, and finally ejects the finished piece.

Material is fed by means of a slide feed, the stroke of which is actuated by a cam, and this feed has a screw adjustment which provides close accuracy and in most cases does away with the need for pilot pins and feed roll release. Grip of the feed on the metal is positive; it is operated by an independent cam, and the pressure is adjustable.

The blanking punch enters the die only enough to cut the blank. The blank is held securely as it is carried down through the die into the transfer fingers by the blank transfer mechanism. The work is held and carried positively at all times in its passage through the machine. In each position the transfer fingers retain a grip on the work until the forming or other tools take hold and the work is again gripped by the next transfer fingers before the tools let go. Each pair of transfer fingers is fitted to the shape of the work to be carried. With this arrangement of tooling, a set of tools consisting of the punch and die blocks with their respective punches and dies and transfer slide and fingers may be removed quickly as one unit, without disturbing any adjustment.

It is stated that the arrangement of the multiple-transfer mechanism is such that different cams for different transfer strokes can be made at no great expense, and these cams may be of split type to facilitate changing. One press with additional cams arranged in this way would then cover any requirement between the greatest transfer distance with least tool stations or operations that would be practicable in the one press.

Either belt or motor drive arrangement can be furnished. The illustration shows the front of a No. 3 press with rewinding metal scrap wheel removed. Scrap cutters can be provided. Specifications of the No. 3 machine



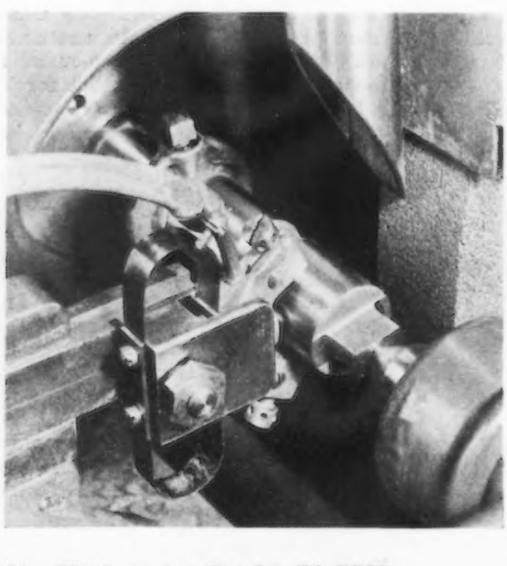

are: Weight, 2200 lb.; stroke of slide, 1¼ in.; stroke of standard transfer, 2½ in.; maximum width of metal, 2 in.; maximum length of feed, 1½ in.; average speed, 125 r.p.m.; standard number of forming positions, 3; pressure exerted, 12 tons; motor, 3 hp.; and floor space, 35 x 40½ in.

# Air Sizing Device Developed for Landis Hydraulic Grinders

AN air sizing device featured as universal in application, fully automatic, consistently accurate, and of simple design has been brought out by the Landis Tool Co., Waynesboro, Pa., for use on its hydraulically-operated grinding machines. It is termed universal inasmuch as it may be used for both external and internal grinding operations of all kinds. It is stated that the surfaces may be sized just as readily whether they are straight, tapered, radial, splined or keywayed; in addition, the external surfaces may be on half diameters and the internal surfaces interrupted or blind.

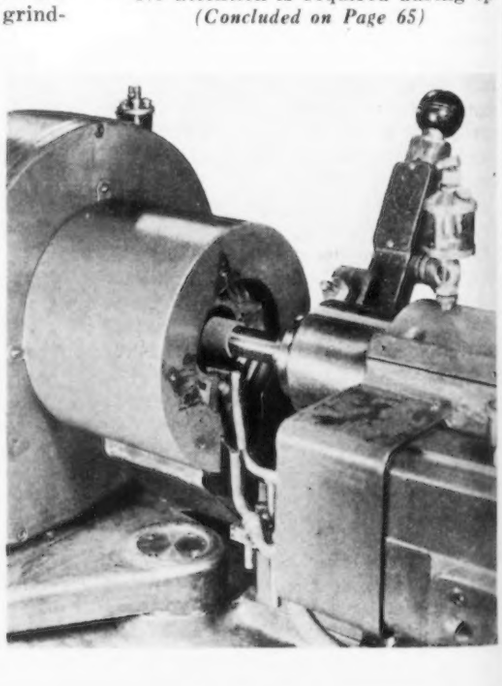
No attention is required during op-

*(Concluded on Page 65)*



▲▲▲

External application of the Landis air sizing device is shown at the left, and the internal grinding arrangement may be seen in close-up view at the right. Straight, tapered, radial, splined and other surfaces may be sized with this device.



## THE NEWS OF THIS WEEK

# British Steel Demand Quiet Continental Market Depressed

LONDON, ENGLAND, Oct. 24 (*By Cable*).—British pig iron is quiet owing to the fact that home consumers are now covered for the remainder of this year. Prices, however, are firmer because of dearer ore and fuel. East Coast hematite has advanced 2s. 6d. per ton to 62s. 6d. for home consumption, with the export price unchanged at 62s. F.o.b. Cleveland prices are also expected to advance.

**British Prices, f.o.b. United Kingdom Ports**

*Per Gross Ton*

| | | | |
|---|---|---|---|
| Ferromanganese, export | £9 | | |
| Billets, open-hrth. | £5 5s. | to | £5 12s. 6d. |
| Black sheets, Japanese specifications | £11 | | |
| Tin plate, per base box | 17s. | to | 17s. 3d. |
| Steel bars, open-hearth | £7 17½s. | to | £8 7½s. |
| Beams, open-hrth. | £7 7½s. | to | £7 17½s. |
| Channels, open-hearth | £7 12½s. | to | £8 2½s. |
| Angles, open-hearth | £7 7½s. | to | £7 17½s. |
| Black sheets, No. 24 gage | £9 5s. | | |
| Galvanized sheets, No. 24 gage | £11 5s. | to | £11 15s. |

**Continental Prices, f.o.b. Continental Ports**

*Per Metric Ton, Gold £ at $4.86*

| | | | |
|---|---|---|---|
| *Ingots | £2 5s. | | |
| *Billets, Thomas | £2 7s. | | |
| Wire rods, No. 5 B.W.G. | £4 10s. | | |
| Black sheets, No. 31 gage, Japanese | £11 5s. | | |
| *Steel bars, merchant | £3 | | |
| *Sheet bars | £2 8s. | | |
| Plates, ¼ in. and up | £3 18s. | 6d. | |
| *Plates, ⅜ in. and 5 mm. | £4 1s. | | |
| *Sheets, ⅛ in. | £4 6s. | | |
| *Ship plates | £4 10s. | | |
| *Beams, Thomas | £2 16s. | 6d. | |
| *Angles (basis) | £3 | | |
| Hoops and strip steel over 6-in. base | £3 15s. | | |
| Wire, plain, No. 8. | £5 7s. | 6d. | |
| Wire nails | £5 15s. | | |
| Wire, barbed, 4-pt. No. 10 B.W.G. | £8 15s. | | |

*Prices as established by European Raw Steel Cartel.

Semi-finished steel makers are well sold on a restricted output and rollers are busier. Tin plate business is improving, with consumers bought into the first half of 1934. Export business in this line is coming from Canada and South America largely. Output at present is 60 per cent, with expectations of an increase.

The Continental steel market is depressed by the world political situation, although cartel prices are being maintained. However, there is apprehension that the cartel may be dissolved by the end of the year; Forges de Clabecq having resigned definitely from it. Negotiations are continuing for the inclusion of Swedish works in the International or the Continental Tube Cartel. Both of these cartels report business to be poor.

Guest, Keen & Nettlefolds, Ltd., British producers, will rebuild the Dowlass steel works at a cost of £2,000,000, with annual output of 300,000 tons of billets and sheet bars. Stewart Lloyds expect to have the new Corby steel works in operation by the end of 1934.

Russia has bought 7000 tons of Czechoslovakian rails.

# Institute to Publish Steel Freight Tariffs

THE American Iron and Steel Institute, acting upon a resolution by its board of directors, has instructed its committee of traffic managers to prepare freight tariff rate books which will comprise the published freight tariff rates to be used in connection with determining delivered prices as provided in section 4, schedule E of the code. The committee proposes to present these freight tariffs in four parts as follows:

(1) A rail and ocean tariff, covering the published tariff freight rates which are to be used in connection with the provisions of commercial resolution No. 8. It is expected that this tariff will be available for distribution not later than Nov. 1.

(2) An all-rail tariff covering so-called official territory; that is, east of the Mississippi River and north of the Ohio and Potomac Rivers including the New England States. It is expected that this tariff will be available for distribution early in November. In this tariff, all rail rates on iron and steel products, both carload and less than carload, will be shown from the thirty-four principal basing points for products covered by the code to all the principal destinations in the territory as defined above.

(3) The third tariff will cover all-rail rates from Birmingham to southern destinations—that is, south of the Ohio and Potomac Rivers—and in this tariff also will be included both carload and less than carload all-rail rates from the principal northern basing points to southern destinations.

(4) The fourth tariff will cover western territory beyond the limits included in the tariffs above described.

Each of these tariffs will be issued in loose-leaf form and it is the intention of the committee of traffic managers to undertake to keep them up to date by the issuance from time to time of such supplements or revised pages as may be necessary.

—

The compilation of railroad freight rates on finished steel products from code basing points to consuming centers which appeared in THE IRON AGE, Oct. 12, 1933, page 35, contained certain inaccuracies. Users of the chart are requested to insert the following corrected rates.:

| | |
|---|---|
| Chicago to Minneapolis and St. Paul | 30c. |
| Coatesville, Pa. to Philadelphia | 8.5c. |
| Coatesville to Camden, N. J. | 9.25c. |
| Bethlehem, Pa., to Philadelphia | 10.5c. |
| Buffalo to Batavia, N. Y. | 8c. |
| Buffalo to Dunkirk, N. Y. | 8.5c. |
| Buffalo to Lockport, N. Y. | 6.5c. |
| Buffalo to Niagara Falls, N. Y. | 6c. |
| Buffalo to North Tonawanda, N. Y. | 3.5c. |

In the compilation of pig iron freight rates published in *The Iron Age* of Oct. 19, page 35, Geneva, Ohio, was incorrectly listed as Geneva, Pa. The rate from Cleveland to Geneva, Ohio, is $1.13.

## To Urge Acceleration of Public Works Projects

WASHINGTON, Oct. 24.—Elimination of the traditional winter lag in both private and public construction, so that employment upon the $3,300,000,000 national construction program will not be interrupted but steadily gain impetus, will constitute one of the major objectives of the fall meeting of the governing and advisory boards of the Associated General Contractors of America, to be held Nov. 13 and 14, at the Willard Hotel, Washington.

Urgent representations are expected to be made to the Public Works Administration advocating the launching of construction projects at an accelerated speed regardless of the seasonal tradition and pointing out the tragic and unnecessary waste of man power and wage earning resulting from seasonal operations, according to Edward J. Harding, managing director of the association.

## Empire Steel Corpn. Is Reorganized

FIVE plants of the Empire Steel Corpn., Mansfield Ohio, were purchased by the reorganization committee at public auction held in Mansfield, Oct. 18, and will be placed under the ownership of the newly organized Empire Sheet & Tin Plate Co., the sale being a step in the reorganization plans announced in THE IRON AGE last week. Included in the sale are sheet mills and steel plant in Mansfield, with six basic open-hearth furnaces, the Falcon, Waddell and Thomas plants in Niles, Ohio, and the Ashtabula plant in Ashtabula. These have 52 hot black sheet mills and an annual capacity of about 400,000 tons of black sheets.

The purchase price was $1,334,000. The Empire corporation has been under the management of C. H. Henkel, receiver, since May 1931. Only the Mansfield plant has been operated for some time and the operation of this plant will not be interrupted by the procedures required in the change of ownership. The sale is subject to confirmation by the Federal Court in Cleveland, which is set for Oct. 30. The new Empire Sheet & Tin Plate Co. has effected a temporary organization with John A. Hadden, Cleveland attorney, as president. Little if any change in the present organization is expected.

The sixth plant of the Empire Steel Corpn., the Empire plant in Cleveland, was acquired by W. H. Davey, president, Canton Tin Plate Co., Canton, Ohio, through its purchase for $47,000 by a group of bondholders headed by D. J. James, who operated the plant several years ago. This plant formerly was operated by the Empire Rolling Mill Co. and later by the Empire Steel Co. Mr. Davey formerly was president of the Empire Steel Corpn. The Cleveland plant will be operated by a separate company to be headed by Mr. Davey. New equipment will be added and while plans are not announced, this plant, which has six hot mills, may be converted into a plant for the manufacture of tin mill black plate to be shipped to the Canton plant for coating.

## Scrap Code To Be Administered Separately

A SEPARATE code authority for the scrap iron industry will be established under a basic code for the entire waste materials industry, with power to administer the code, receive complaints, make investigations, act as a clearing house for all reports required by the Government, and make recommendations and amendments restricted to the scrap iron industry. This decision was made during the conferences which took place in Washington last week between NRA officials and representatives of every branch of the waste materials industry. It is reported that the code authority for the scrap iron trade has been tentatively set at 15 members, to be selected in a manner to be approved by the administrator. Adequate representation will be provided for the small mixed dealer who handles other commodities besides scrap iron.

The principle of self-government and complete autonomy in each commodity division was recognized by the deputy administrator. Similar code authorities are expected to be established for non-ferrous scrap metals, wool stock, scrap rubber, waste paper and cotton rags. These principles will be incorporated in a general basic code for the waste materials industry, which is now being drafted by representatives of several trade associations, at the request of the Administration. This basic code will contain uniform maximum hours and minimum wages for the entire industry, and will outline the separate code authorities for each commodity.

## Alloy Casting Code to Be Submitted

WASHINGTON, Oct. 24—A hearing will be held Nov. 2 on the code of fair competition submitted to the National Recovery Administration by the Alloy Casting Association, Inc., claiming to represent 90 per cent of the industry. Labor provisions of the code establish a basic 40-hr. maximum week with a possible 48-hr. not to exceed 12 weeks in a year. The minimum wage is 35c. an hour, and a provision is made that 90 per cent of the employees of each foundry shall receive higher wages than minimum.

## September Building Contracts Increase

SEPTEMBER construction contracts amounted to $122,615,700, a gain of almost 16 per cent over August total of $106,131,100 but slightly below the September, 1932, total of $127,526,700, according to F. W. Dodge Corpn. This is the first month in which the 1933 total practically equaled the corresponding month of 1932. The cumulative total for the first nine months of 1933 amounted to $743,553,300 as compared with $1,057,363,200 for the corresponding period of 1932. The largest gain in the September contract record over August occurred in public works with a month's total of $57,323,800 as compared with $32,002,500 in August. This increase was due largely to additional contracts for highway construction and levee work in the Mississippi valley.

Indicated expenditures for total building construction increased 9.7 per cent in September, as compared with August, according to reports received by the Bureau of Labor Statistics from 764 identical cities having a population of 10,000 or over.

Contracts awarded for Federal building operations during the month totaled $5,207,895 as compared with $265,232 in August. Federal awards for construction projects of all kinds totaled over $260,000,000. This includes, in addition to building construction, the awards for public roads, river and harbor work, naval vessels, gium, Czechoslovakia, Sweden, Ger-

## Commodity Price Index Declines

THE index number of wholesale commodity prices of the Bureau of Labor Statistics showed a slight weakening of prices during the week ending Oct. 14 and receded to the level of the week ending Sept. 30. In the past week it stood at 71.1 as compared with 71.3 for the previous week. The slight recession in prices is the second break occurring in the past four weeks of the continuous upward trend of wholesale prices since the first week in March.

## Tyson Corporation Gets British Patent

THE Tyson Roller Bearing Corpn., of Massillon, Ohio, has been granted a patent by the British Government on the Tyson cageless tapered roller bearing. The patent rights cover all British possessions. Tyson had previously been granted patents in the United States, Canada, Belgium, Czechoslovakia, Sweden, Germany and France.

# Carnegie Advisory Board Reviews Metallurgical Developments

At the invitation of the Metallurgical Advisory Board to the Carnegie Institute of Technology, metallurgists from all parts of the country gathered at Pittsburgh on Oct. 20 for the seventh annual open meeting of the board. The research activities of the past year were reported by various investigators and were discussed by experts from the industry.

During the first year of the reorganization of the metals research laboratory at Carnegie, its director, Dr. R. F. Mehl, has undertaken two new lines of research: the precipitation from solid solutions and the problem of internal strains in metals. The studies of iron-manganese and iron-manganese-carbon alloys were continued and complete the proposed program on these alloys. Progress was reported on corrosion resisting and heat resisting alloys. The research staff of the Metallurgical Advisory Board has continued its open-hearth studies, designed to allow a closer control of the finishing stages of liquid steel manufacture. At the same time, the problems of variation in response to heat treatment and age hardening were investigated with particular respect to the effect of the oxygen content of liquid steel.

At the opening session in the Carnegie Union, Jerome Strauss, chief research engineer, Vanadium Corpn., presided. Dr. F. N. Speller, chairman of the advisory board, made the address of welcome. He pointed out that the Metallurgical Advisory Board completes ten years of service this year. It was organized in 1923 to conduct cooperative research along metallurgical lines. The result of this research work has been better steel without increasing cost and sometimes with lower cost of production and a marked stimulation of thought along these lines.

Dr. Mehl presented a general report on the work of the metals research laboratory. He summarized the recent studies upon the Widmannstätten structures of iron-nitrogen alloys, of quenched pure iron, of pearlite and of magnesium-tin alloys. After discussing the proposed program for work, (a) on the orientation of oxide layers on iron, (b) on a study of the stages in the decomposition of austenite, and (c) on the effect of external elastic loading upon the rate of reaction in the solid state, Dr. Mehl briefly discussed the alloys of iron, manganese and carbon. Thermomagnetic analysis and measurements of electrical resistance have further increased the knowledge of the constitution of this very complex ternary system.

Dr. C. S. Barrett gave a review of the literature and of the various methods of analyzing internal stresses. Since the mechanical methods are of little usefulness, except on specimens of very simple shape, the suitability of X-ray methods was investigated. The use of back reflection photograms seemed to be most promising. This is an X-ray method of measuring macroscopic stresses with fair accuracy. Preliminary experiments in this direction were reported by Dr. M. Gensamer. After developing a mathematical treatment of the relations between X-ray reflections and strains, actual experiments were carried out which indicated an accuracy of this method of plus or minus 4000 lb. per sq. in. The reports were discussed by R. L. Templin, Aluminum Co. of America, by A. V. de Forest, consulting metallurgist, and by A. Nadai, Westinghouse Electric & Mfg. Co., who pointed out the necessity of studying the various factors causing residual stresses in steel. Magnetic measurements, which indicate the amounts of elastic strain, might prove useful in this work. Attention was called to the importance of the shape of the stress-strain diagrams in connection with residual stresses. Finally, it was stated that internal strains are frequently being used to improve tensile and fatigue properties.

### Decomposition of Austenite

Dr. F. M. Walters described the design of a new dilatometer which allows the determination of transformation temperatures within 2 deg. F. A redetermination of certain parts of the iron-carbon equilibrium diagram is planned. It was found that in oxygen free alloys the $A_3$ and $A_1$ transformations were markedly lowered as the rate of cooling was increased, while the alloys containing oxygen were much less affected. Dr. C. Wells reported results of preliminary studies of the segregation of ferrite in hypo and cementite in hypereutectoid steels using alloys of various compositions and various rates of cooling. He also discussed the preparation of special high purity iron carbon alloys. These alloys are prepared from hydrogen purified carbonyl iron by gas carburization. The method of gas carburization consists in passing hydrogen through liquid turpentine to produce a gas mixture very high in hydrogen.

The effect of deoxidation and furnace manipulation on the rate of austenite decomposition was presented by Dr. C. H. Herty and D. L. McBride. The factors involved in the rate of ferrite formation are: (a) the grain surface per unit of volume; (b) the degree of supercool, and (c) the rate of carbon diffusion from the grain boundary toward the center of the grain. A simple formula was derived to determine the specific reaction $k$ of various types of steels. The value of $k$ of aluminum killed heats was found to be 70 per cent higher than that of silicon killed heats.

In discussing the work, E. E. Davenport, research laboratory, United States Steel Corpn., pointed to the marked influence of coarse austenitic grain size in retarding the rate of transformation at constant temperature. He confirmed further that hardenability is not materially influenced by quenching temperature in the absence of variations in the grain size of the austenite. He showed further that undercooling suppresses the reaction of the pro-eutectoid phase and that a definite reaction constant exists for the pearlite reaction as well as for the pro-eutectoid ferrite reaction. Further discussion was given by O. E. Harder, assistant director of research, Battelle Memorial Institute, who suggested the explanation of the behavior of various types of steels on the basis of germination. H. W. McQuaid pointed to possible connections between hardenability and machinability. He also emphasized the effect of the time during which a steel is held above the upper critical temperature on undercooling.

### Corrosion-Resisting and Heat-Resisting Alloys

At the afternoon session, L. F. Reinartz, representing the open-hearth committee of the American Institute of Mining and Metallurgical Engineers, presided. Dr. V. N. Krivobok, head of the graduate metallurgical work at Carnegie, reported on his recent studies of heat-resisting alloys. By means of a previously described test method the so-called "characteristics" of a given alloy are obtained under conditions of constant temperature and stress. Most of the tested alloys were of the 18-8 type to which special additions were made. The tests showed that grain size plays a very important rôle and that in order to obtain comparable characteristics the structure of the alloys prior to the test must be considered. It was found that the actual strength of the alloys at the selected high temperature bears no relation to their performance under constant load at the same temperature.

The change in structure of the alloys under conditions of service at elevated temperature is very pronounced and consists mainly in a separation and agglomeration of carbides. Grain boundaries with carbides precipitated are less resistant to intercrystalline attack. It was found that alloys of short life showed numerous deep penetrations of intercrystalline attack which were absent in the alloys of very long life. In discussing the work, George M. Eaton, director of research, Spang-Chalfant Co., pointed to the practical importance of "prospecting research" as carried out by Krivobok. The petrole-

um refining industry is keenly interested in the development of alloys to withstand high temperatures. The creep data on 18-8 type alloys appear questionable in view of the fact that these alloys are gradually changing.

### Control of Iron Oxide in Open-Hearth Slags

Dr. Herty and C. F. Christopher reported on further open-hearth studies. Recent experiments indicated the outstanding importance of slag viscosity in controlling the interreaction among metal, slag and gas. By dividing the open-hearth heat into four distinct parts the change of oxygen in the slag was carefully studied for each part. Because for every grade of steel there is a proper FeO content of the metal and therefore of the slag, the chemical and physical methods of control were given special attention. Besides slag analysis and fluidity measurements before and after ore additions the use of phosphorus analysis of the metal was considered because phosphorus in the metal is very sensitive to changes in the concentration of FeO. A relationship between phosphorus in the metal one hour after the ore addition and FeO in the slag before deoxidation was established. With this relationship it is possible to take a metal test one hour after the ore addition and to adjust the amount of FeO in the slag to any desired finishing content. In working on killed steels, the phosphorus reversion must be taken into account.

In discussing this report, J. W. Kinnear, chief metallurgist of the Homestead plant, Carnegie Steel Co., stressed the economical side of iron oxide control in slags. At present these methods are hardly applicable to large tonnage production. R. O. Griffis, associate director of research laboratories, American Rolling Mill Co., pointed out that increase in yield and in quality of the steel might make iron oxide control practical. W. J. Reagan, assistant open-hearth superintendent, Edgewater Steel Co., showed by various examples that for their work of high-carbon steels and cold charges, Dr. Herty's method was practical. It gave absolute control of FeO in the slag and produced a better quality steel at lower cost.

### Effect of Deoxidation on Aging of Mild Steel

Dr. Herty briefly summarized the work on this problem. There are indications that the degree of oxidation of steel in the furnace has considerable bearing on the strain aging of aluminum killed steels. Aging is attributed to the combined presence of carbon and oxygen in steel. Carbon alone without oxygen, and oxygen alone without carbon do not result in aging, but the combined presence of both does give rise to aging.

The report was discussed by Anson Hayes, director of research laboratories, American Rolling Mill Co., who called attention to the combined effects of cold working and aging on impact strength. He suggested a lower amount of cold deformation and an aging temperature of 250 deg. C. instead of 450 deg. C., as aging at 450 deg. C. may be considered as low temperature annealing. The use of the tensile tests for studying aging properties of mild steel should also be considered.

Further discussion was given by S. Epstein, research metallurgist, Battelle Memorial Institute, and H. W. Graham, general metallurgist, Jones & Laughlin Steel Corpn. The need of fundamental research on aging by using, for instance, vacuum melted materials was emphasized. A correlation between quench aging and strain aging should be made. The part played in aging by refractory particles should not be overlooked.

Dr. Virgil Jordan, president, National Industrial Conference Board, addressed the dinner meeting on the subject of "Industrial Progress and Governmental Policy." Productive industries of the United States, he contended, are menaced by the danger of destruction of their foundations and the full development of the industrial arts by political dictatorship based on popular delusions and economic fallacies.

# Steel Fabricators Discuss Code at Chicago Meeting

PROVISIONS of the code of fair competition for the structural steel and iron fabricating industry were discussed in an executive session of the American Institute of Steel Construction, which held its eleventh annual convention at Chicago, Oct. 19 to 21. The code has been submitted to the National Industrial Recovery Administration. The meeting was for the purpose of explaining in more detail contemplated operations when the code is finally approved and put into effect. Assents to the code as now drafted have been received from approximately 80 per cent of the industry by volume.

C. Edwin Michael, president, Virginia Bridge & Iron Co., Roanoke, Va., a member of the code committee, said: "Conditions which obtain in the respective sections of the United States had to be considered in fixing hours of labor and rates of pay, both in the plants and for erection work in the several sections of the country. Statistics furnished by 253 fabricators from all over the United States showed the minimum rates paid in their plants during the years of 1926 and 1928, and the average rates paid in those plants during that period and subsequently. These statistics had been accumulated over the past 15 or 20 yr. for erection work throughout the country."

Pending approval of the structural steel code by the administrator, fabricating shops in most instances have already put into effect increases in pay and reduction in hours contemplated in this code, bringing this industry into conformity with practices existing among the steel mills. In most instances these increases went into effect September 1.

The code contemplates representation and participation by all members of the industry in proportion to their previously established productions, and that those engaged in the business of erecting bridges and structural steel may, upon application, have similar proportionate representation and participation. During the period of emergency, however, it is provided that no additions will be made to existing fabricating capacity, except as may occur in increasing operating efficiency.

Clyde G. Conley, president of the institute and president of the Mount Vernon Bridge Co., Mount Vernon, Ohio, said: "I do not believe the industry as a whole would exist very long if we did not keep the efficiency of our plants up to a high standard. Consequently, it is in the interest of the industry that we modernize and change our equipment so as to increase our efficiency. If you change your efficiency, it cannot help but follow that you slightly increase the capacity of the plant, practically speaking. On the other hand, we do not need any more fabricating capacity in this country, and it is the intention of the code not to permit additions to capacity. We can restrain the building of new capacity but that does not prohibit us making our existing capacity more efficient by modernization."

The code contemplates the gathering of statistical information, which will be available for members, the directors of the institute, the Government, and, therefore, the public, relating to hours of operation, minimum and average wages paid, volume of business, price levels and other data.

"Doing business without covering all items of cost encourages the establishment of sweatshops and results in bankruptcy," said W. M. Wood, president, Mississippi Valley Structural Steel Co., another member of the code committee. "It is essential therefore that provision be made to care for this in requiring that all bids on all projects be filed with the institute. These bids will not be examined unless a complaint is made that not all cost items have been covered.

# Iron and Steel Electrical Engineers Trace Trends of Current Mill Practice

SEVERAL sign posts of industrial trends may be said to have been brought to light by the convention last week of the Association of Iron and Steel Electrical Engineers. One of these is that pioneering in steel mill electrical engineering is still in progress, mill electrification having brought in its wake a continuous succession of systems of regulation and control that are distinctly the task of the electrical expert. Meanwhile, outside of the purely electrical field, interest is on the increase toward achieving close, if not automatic, control of furnace and rolling mill operations. A third indicator of industrial changes lies in increased attention to lubrication, with the coming of the lubrication specialist, whose need was recognized only a few years ago. Continued active consideration is to be reported for the welding of rolled and forged steel in connection with machine construction.

The meeting was held at the William Penn Hotel, Pittsburgh, Oct. 17, 18 and 19. It was the twenty-ninth convention of a body whose deliberations in the earlier days revolved largely about industrial hazards and safeguards and from which sprung the National Safety Council.

There were seven technical sessions, an exhibition of equipment, also in the hotel, and an afternoon spent in visiting the mills of the Allegheny Steel Co. at Brackenridge, Pa., and the American Sheet & Tin Plate Co., at Vandergrift, Pa. The president of the association, W. E. Miller, electrical and mechanical superintendent of the Bethlehem Steel Co., at Johnstown, Pa., called the convention to order, but for the several sessions different chairmen had been appointed, including C. A. Kral, superintendent of rolling mills, Wheeling Steel Corpn., Steubenville, Ohio; G. R. Carroll, electrical superintendent, Jones & Laughlin Steel Corpn., Aliquippa, Pa.; B. R. Shover, consulting engineer, Pittsburgh; C. C. Pecu, lubrication engineer, Bethlehem Steel Co., Lackawanna, N. Y.; G. A. Hughes, electrical engineer, Truscon Steel Co., Youngstown, and F. E. Leahy, fuel engineer, Youngstown Sheet & Tube Co., Youngstown.

The first two sessions were almost wholly electrical. Papers were presented by W. H. Burr, electrical and mechanical superintendent, Lukens Steel Co., Coatesville, Pa., who gave a notably comprehensive survey of engineering developments in the steel industry; by Stephen Badlam, consulting engineer, Pittsburgh, who reviewed in detail the progress of the manufacture of wide strips; by A. F. Kenyon, general engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, who devoted himself to the electrical contrivances provided to meet the special requirements of cold rolling strip mills; by F. Mohler, industrial engineering department, General Electric Co., Schenectady, N. Y., who covered the General Electric contributions to the regulation and control of cold strip mills, and by D. C. Wright, chief engineer, Electric Controller & Mfg. Co., Cleveland, who discussed the automatic screw-down apparatus which was described in THE IRON AGE of Oct. 19. Some of these papers will be reviewed in these columns in later issues. Part of the ground covered by Mr. Mohler was the subject of an article by him, in THE IRON AGE of Oct. 5, in which it was brought out that the success of modern cold rolling of thin flat steel owes as much to the niceties of electrical control as to the ingenious mechanical features of the equipment.

### Rolling Broad Strips

Mr. Badlam classified the rolling of broad strips under four systems. These are: (1) Mills having three to five stands for tandem rolling with delivery to a tension coil; (2) those based on pre-existing mills rolling in short lengths and therefore without tension rolling; (3) the Steckel-type mill, in which all the power is transmitted from the reels by pulling the strip between the two small diameter backed-up working rolls; (4) the single-stand reversing mill, also of a four-high combination, but with a motor drive for the working rolls as well as for the reels. In this combination, each reel motor is of about one-half the power of that for the working rolls.

He told of Steckel motors in the mills of the Weirton Steel Co. and the Follansbee Brothers Co. for handling 36-in. width steel and of four of the last mentioned type, two at the Gary works and one at the Jones & Laughlin Aliquippa works and one at the Indiana Harbor plant of the Youngstown Sheet & Tube Co. He lauded the product of the broad strip mills and said the technological advances had been rather quickly passed on to the consumer. He estimated that the combined output of these modern mills was 500,000 tons a month. Included among the illustrations of his paper was a motion picture rendition of the operation of a mill of the Inland Steel Co., of a Pratt & Whitney continuous precision indicator (giving a micrometer measurement of the gage of material as it is being rolled) and of an application of a Selsyn system for giving instantaneous readings of the draft on the metal.

In the discussion following Mr. Wright's paper it was suggested that automatic screw-downs ought to prevent operations contrary to orders, as, for example, when, in the desire for tonnage, a draft of 3 in. is taken instead of 2 in., or a pass is skipped, especially if the metal seems hot or it is the night shift—for the suspicion was expressed that the greater tonnage commonly claimed by the night turns represented cheating of the character mentioned. The screw-down apparatus was described by one member as doing exceedingly well what it set out to do.

### Anti-Friction Bearings

Anti-friction bearings in connection with cold mills were the subject of two papers, one by F. C. Hallmark, general master mechanic of the Wheeling Steel Corpn., at Steubenville, Ohio, and the other by C. J. Klein, chief engineer, Weirton Steel Co., Weirton, W. Va. Mr. Hallmark advocated inspections of the bearings at intervals with careful records of observations for the guidance of maintenance men. He classified troubles as due to fatigue failures, although they also came from corrosion, which therefore required water-tight seal rings on the bearings. Spalling, he emphasized, was an indication of the overloading of a bearing.

Mr. Klein believes it important to have a department to handle the anti-friction bearings, as the men so employed become highly efficient in caring for the bearings and any troubles are minimized. He prefers an automatic lubricating system, with the lubricant delivered at proper intervals. He regards it desirable to keep rolls fitted with the bearings to facilitate and expedite roll changes. End thrusts on the small working rolls of cold mills resulted in applying the anti-friction bearings to them with the added result that increased rolling speeds were possible. He suggested the use of such bearings on screw-downs and for other applications. He described the sizes of rolls coming under his experiences, mentioning

that there had been fewer roll breaks with the bearings and that, with the pressure indicators now available, the information obtainable on working conditions was positive and definitely helpful.

W. R. Clark, Bridgeport Brass Co., Bridgeport, Conn., referred to the early work in non-ferrous applications of the anti-friction bearings. Failures in three to four months were superseded by a life of over two years by changing from grease to a slow continuous oil lubrication. He advocated the use of hardened steel, flexibly set under the bearings of the bottom rolls, to provide a floating of the bearing. Water getting into the bearings is filtered out of the oil in circulation.

Two unusually comprehensive papers on reduction gear sets for main mill drives were presented. One of these was contributed by T. Holloway, gear consultant, United Engineering & Foundry Co., Pittsburgh, and the other by Austin Kuhns, engineer, Farrel-Birmingham Co., Inc., Buffalo. They covered the design of the gears, the optimum material for the gears, the design and manufacture of the housings, the use of welding of rolled steel in that connection and, all in all were of encyclopaedic scope. Mr. Holloway paid particular attention to the Sykes gear generator, and Mr. Kuhns discussed the lubrication problem at length.

Two sessions were devoted to welding. E. A. Hurme, engineer, Clark Controller Co., Cleveland, traced the growth of the electric arc welding. This paper, which will be reviewed in a later issue, pointed out that whereas in 1927 approximately 85 per cent of the electric arc welding was done with bare rods, in 1932 bare rods constituted considerably less than 25 per cent of the total consumption of arc welding rods.

### Frameless Steel House

Bennett Chapple, vice-president, American Rolling Mill Co., Middletown, Ohio, enthused the audience in his inimitable fashion with an outline of the promise of utilizing welded sheets for walls, floors and roofs of the relatively small building. He told of the house of that type that has already withstood the examination by some 1,500,000 visitors to the Century of Progress exhibition at Chicago. The building represents the successful welding of No. 20 gage sheets formed into square or Z-shaped corrugations and providing a cellular arrangement of ample strength to carry loads, with any surface finishes as desired, such as stucco, brick or wood veneer, enameled material and the like.

He termed this as the frameless steel construction used by the Insulated Steel Construction Co., Cleveland. The sheets are spot welded in sections suitable for erection on the job. In light structures these sections are put together with metal screws. In heavier structures with heavier metal, such as store houses, these sections are arc welded in the field. The acetylene torch is used to cut openings for plumbing and heating needs.

The floor section is made up of Z-shaped sheets, each lapping the other, making a continuous span of metal boxes 8-in. wide and 5½-in. deep. This construction requires two welds, one each on the top and on the bottom, made simultaneously as the material travels through the welding machine. Resistance welding here used was worked out by John Skove, engineer of the Insulated company, employing low voltage and high pressure at the point of contact. Air cylinders are used for the purpose, giving 1200 lb. pressure at the welding contacts. The pressure is on a brief second for each double weld and the current is applied one-third of the time. The sheets are run of mill with scale unremoved and oiled, a fact that seems not to interfere with the success of the welding. The machine was built by the Federal Machine & Welder Co. for the Insulated Steel Construction Co.

### Welded Steel for Machine Construction

Welding in machinery construction was discussed by F. L. Lindemuth, chief engineer, William B. Pollock Co., Youngstown. Following are some of his observations:

Welded construction is justified when it is as good as and costs less than other construction, when it costs the same and is better, or when it has certain advantages which no other construction has.

To get the best results we should not try to make it exactly like something in which the method of manufacture or the qualities of the material was a large factor in determining the shape, proportions and appearance of the product, but should consider the properties of the materials used and the special advantages of the method of fabrication. Cast and forged details can often be used to advantage. If the job is well designed and constructed, the appearance should be pleasing.

The tendency is to use too much rather than too little weld material. The joints and connections are inconspicuous compared with most other kinds of construction, and the great strength of welds is therefore not always appreciated. The cost of the deposited metal is high. For hand welding it will run between 50 cents and $2 a pound depending on the class of work. An excessive amount of welding will run the cost up very rapidly.

The use of welded rolled steel was the subject of a paper by Lloyd Jones, who dwelt on machines of large size built by the E. W. Bliss Co. He is of the conviction that the steel manufacturers may well assist the machine designer in the development of new or modified shapes, and he suggested the appointment of a committee to canvass the situation as to sections that may be used in machine design with the least amount of welding, cutting and bending. Mr. Jones is now identified with the Continental Rolls corporation.

Other papers on welding were presented by A. E. Gibson, vice-president, Wellman Engineering Co., Cleveland, who devoted himself to the advantages of welded design with reference to weight, strength, time and costs; by R. V. Devlin, transportation engineering department, General Electric Co., Erie, Pa., who described the part taken by rolled steel and arc welding in the fabrication of locomotives; and Gilbert D. Fish, consulting structural engineer, Westinghouse Electric & Mfg. Co., New York, who compared welding with riveting and bolting for steel-building connections.

### Suggests Higher Roofs for Open-Hearth Furnaces

Two sessions revolved around combustion engineering. William C. Buell, Jr., engineer, Cleveland, in a paper dealing with heat transfers in the open-hearth furnace, expressed the opinion that the chamber over the bath should be materially enlarged, which makes it mandatory that the roof be raised. An investigation of 15 modern furnaces, seven fired with raw fuels and eight with mixed fuels, led Mr. Buell to conclude that a longer time of gas contact will produce material fuel economy. A longer time of contact means diminished gas velocity but he finds that if the factor of time "is correctly included in the problem, a much greater relative heat transfer will actually result from the lower velocity, instead of a less heat transfer, as might be assumed were the rule that increasing velocity increases the heat transfer rate applied without proper qualification." The raising of the roof, he added, besides affording additional fuel economy will lengthen the roof life and expedite charging, particularly of light scrap.

The emphasis on fuel economy arose out of an examination of current practice. With 45 per cent hot metal, in low carbon basic operations, about 800,000 B.t.u. of heat, he pointed out, must be added to the bath for each ton of steel produced. More than five and often six and seven times the

amount is supplied as primary fuel. Of the 15 furnaces studied, the furnace gas velocity ranged from 4.7 to 11.9 ft. per sec., the time of gas contact with the bath varied from 3.1 to 7.8 sec. and the transfer coefficient ranged from 18 to 33 B.t.u. per sq. ft. of hearth per hour per degree of temperature difference.

Heating furnaces in connection with sheet and tin mills were discussed by R. J. Wean, president, Wean Engineering Co., Warren, Ohio. Modern continuous pack and pair heating furnaces, like all other innovations, he said, had received considerable resistance from sheet and tin plate producers until it was demonstrated that results were far superior to those obtained from the older types. The heating results, he emphasized, have been exceptional and "have permitted tonnage production from single stand units far in excess of anything ever considered possible. Where a finishing stand formerly produced 5 or 6 tons of light gage sheets in 8 hr., the heating facilities now permit 30 tons in 8 hr. of the same gages and peak productions are much higher."

Mr. Wean showed the development of furnace design in recent years, culminating in the long furnace with the longitudinal division wall. He mentioned the notably high production obtained at the Tata works in India with continuous furnace and mechanical tables applied to the conventional single stand mills. These results were itemized in THE IRON AGE of Oct. 5, but they have since been exceeded, and Frank L. Estep, vice-president, Perin Engineering Co., New York, the consulting engineer on the Tata work, at the request of Mr. Wean, mentioned that latest reports by cable show an average of 45 tons rolled per shift so far in October and that one recent shift had produced more than 65 tons.

A summary of electric furnace applications for the annealing of strip and sheets was given by A. N. Otis, industrial engineering department, General Electric Co., Schenectady, N. Y. This covered: Bell type furnaces for batch annealing of coiled strip; the rectangular bell furnaces for annealing silicon sheets provided with recirculating system for forced cooling; continuous furnace with controlled atmosphere, recently installed for annealing of silicon strip; walking beam furnace for bright normalizing and annealing of auto body or similar sheets, provided with means to control the cooling rate. (Such furnaces have been laid out for 120 tons output per day, offering the possibility of eliminating the pickle after normalizing, and also for continuous annealing as a substitute for box annealing, greatly shortening the process time); roller hearth furnace for bright normalizing or annealing cold drawn steel tubing; bell type furnaces for bright annealing steel wire; modified bell type furnaces for non-scaling anneal of steel wire.

The combustion engineering papers included also one by G. A. Merkt, engineer, combustion control department, Morgan Construction Co., Worcester, Mass., and by W. R. Culbertson, manager, furnace division, Rust Engineering Co., Pittsburgh. Mr. Merkt introduced a combustion conditioning process and apparatus that takes into account for industrial furnaces such elements as combustion speed, flame temperature and means for adjusting or controlling these factors. Mr. Culbertson took up the problems of heating slabs for hot strip mills.

### What the Exhibition Typified

The association held an exhibition in the William Penn Hotel. It typified the current interest in rational or automatic control, as of the operation of open-hearth furnaces or of rolling mills, the important position gained by electrical engineering in steel manufacture, the scientific approach to the problems of lubrication being manifested and the popularity of anti-friction bearings. Among the exhibitors were the following: Alliance Machine Co., Allis-Chalmers Mfg. Co., Bacharach Industrial Instrument Co., Bailey Meter Co., Bartlett-Hayward Co., Benjamin Electric Mfg. Co., Clark Controller Co., Crouse-Hinds Co., Cutler-Hammer, Inc., Edison Storage Battery Co., Electric Controller & Mfg. Co., Fafnir Bearing Co., Farval Corpn., Foxboro Co., General Electric Co., Habirshaw Cable & Wire Corpn., Homestead Valve & Mfg. Co., Hyatt Roller Bearing Co., I-T-E Circuit Breaker Co., Journal Lubricator Co., Keystone Lubricating Co., Leeds & Northrup Co., Morgan Engineering Co., National Carbon Co., Ohio Carbon Co., Otis Elevator Co., Pennsylvania Lubricating Co., Pittsburgh Reflector Co., Poole Foundry & Machine Co., Reliance Electric & Engineering Co., Roller-Smith Co., Rollway Bearing Co., Inc., S-K-F Industries, Inc., Timken Roller Bearing Co., Tool Steel Gear & Pinion Co., Trumbull Electric Mfg. Co., United American Bosch Corpn., R. E. Uptegraff Mfg. Co., Westinghouse Electric & Mfg. Co., and Yale & Towne Mfg. Co.

# More Leisure Coming, Says Myron C. Taylor

REFERRING to the findings of the National Industrial Conference Board that the present depression reached its depth about the middle of last year and that the world as a whole has since then made slow but substantial progress and expressing faith that times will shortly be better, Myron C. Taylor, chairman of the United States Steel Corpn., in a speech before the American Institute of Steel Construction in Chicago, Oct. 20, said that if any one doubts the observations, as far as this country is concerned, at least, "let him compare present conditions with those that obtained a year ago and answer whether he would exchange."

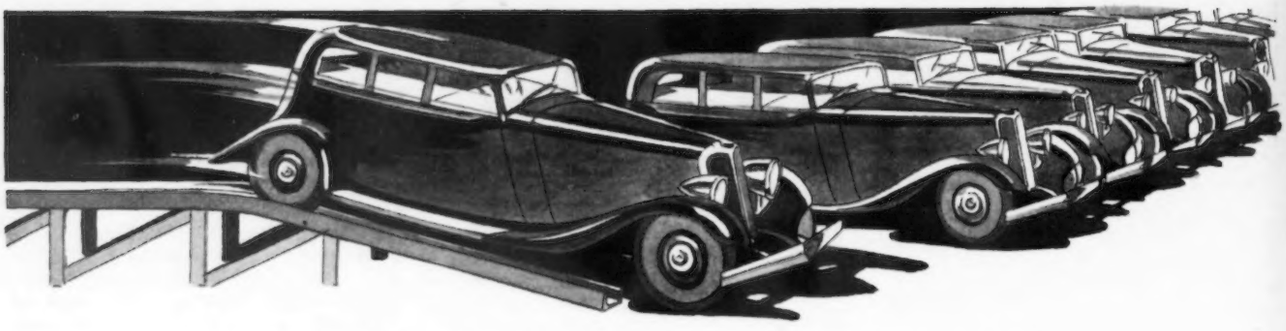
"We are now in a period of marked transition," he continued, "but it is well to remember that all human change has been for ultimate progress, even though change ofttime means temporary retrogression. We are passing through a social and economic upheaval unparalleled in modern times. It is interesting to recall, however, that ever since the Pharoahs there have been lean years and fat years, and in ancient times there was alternately abundance and want in the land, largely as there was rain and drought. Which it should be, lay in the lap of the gods, and the decision was essentially beyond man's ken and ability to control. We must remember that it is inherent in human nature to stumble and fall, to rise, to walk, to run, only to stumble and fall again. We in modern times still have our cycles of depression and prosperity, but, thanks to our control over Nature's forces, abundance or want is now largely for man to decide by his own actions and determination.

"Now, I am a firm believer in the homely virtues of thrift, hard work and living within one's means. There has been too much spending of what one has not got; too great a desire to get rich quick; too great a tendency to sacrifice public welfare for selfish purposes and personal gain.

"We are not entirely certain of the ultimate hours and days of labor that will prove desirable for man. We are faced with something which only a short time since we vainly sought and prayed that we might enjoy—and that is greater leisure. . . .

"Great changes follow not upon an effort or agitation to bring them about, but rather upon necessities like the one in which we now find ourselves. In the present situation hours of labor and the days of labor are lost sight of in the formula to distribute among those who are customarily employed in a particular establishment the work for which there are orders.

"Out of the fermentation caused by this upheaval," he said later in the address, "will come, slowly but surely, plans and policies which in effect will adjust production to consumption and the relation of men and women to production—and from that point onward we will start upon another cycle in which opportunity for leisure will form a part."



▲▲▲ THIS WEEK ON THE ASSEMBLY LINE ▲▲▲

# Motor Car Output Drops Sharply; October Now Estimated at 130,000 Units

DETROIT, Oct. 24.

THE automobile industry promises little for parts and materials suppliers in the next two months. With a few exceptions, notably Chevrolet, Plymouth and Dodge, assemblies are rapidly dropping off and seven factories are virtually closed. Curtailment of output has been so sharp that the month's total will be nearer 130,000 than an earlier estimated 145,000 units.

There is much confusion in individual plants regarding materials and methods for making certain parts for 1934 cars. Coil springs is a notable example, as the analysis of the steel to be used and the manufacturing process are matters yet to be decided by some leading companies. The labor situation in southern Michigan remains delicate, and the strike of tool and die makers is having an adverse effect on preparations for new models. Altogether, these factors have had a depressing effect and the buoyant spirit so pronounced in Detroit in recent months has given way temporarily to a feeling of uneasiness. This has been accentuated by happenings outside the automotive field, such as the troublesome farm situation, the increasing dissatisfaction with NRA and the European crisis.

Yet, in the midst of these uncertainties, General Motors has taken a step which is perhaps the most significant proof that the automobile industry believes the country definitely on its way out of the depression. It is giving back to its Pontiac, Buick and Olds divisions their individual sales autonomy which early last year was surrendered to the Buick-Olds-Pontiac Sales Co. The B.O.P. did a good depression job, but it was strictly a depression organization and now that it has fulfilled its purpose it will disappear from the scene. Alfred P. Sloan, Jr., in a statement in connection with the change, declares that "separate division identity and executive responsibilities incident to the same have from the very beginning of the corporation's existence been a fundamental principle in its administrative policy. On account of the sharp contraction of volume incident to the period of depression, it became absolutely essential to effect certain consolidations in order to make possible essential economies in operation. It is believed that the improved outlook justifies reinstating the operating plan in accordance with the corporation's established policy."

The ascendancy of W. S. Knudsen to a position second in command to Mr. Sloan in General Motors Corpn. brings to the top a man whose entire career has centered about manufacturing rather than sales. He is well known to many steel men who in large steel transactions with Chevrolet in earlier years dealt with him personally. He is represented as being a strong advocate of decentralization, which has always been the keystone of General Motors policies. Under his regime Buick and Oldsmobile again are to be independent of each other with their own general managers rather than under joint managership as during the administration of I. J. Reuter, who has retired. Although there has been no statement made about the future purchasing policy of the corporation, it is assumed that the chances of a further centralization of purchases are slim in view of the general trend back toward independence of the various car-making divisions. Moreover, Mr. Knudsen, even in the darkest days of the depression when economies were foremost in mind, did not institute centralized purchasing in Chevrolet, the various manufacturing plants retaining their own purchasing departments.

So far as production economies are concerned, it is a fairly well established fact that manufacturing will be continued pretty much as it is now set up. That is, Chevrolet will not alter its program of making forgings for Pontiac, and Buick still will turn out parts for Oldsmobile. In line with the General Motors policy, it is probable that as production volume increases to the point where the manufacturing capacity of one division is needed solely to supply that division, General Motors again will turn to outside suppliers. But that day seems too far distant to cause much enthusiasm yet on the part of hungry suppliers.

Chevrolet, attempting to clean up the production run on its present car, will make over 40,000 cars this month, as against an earlier estimate of 35,000. Ford has sharply curtailed its operating rate at the Rouge plant, where it is understood daily output has fallen to 500 motors a day. It is said that Ford has built up a substantial bank of motors and other finished parts so that the rate at Dearborn cannot be taken as an index to assembly activities, which are much higher. Ford's Exposition of Progress at Convention Hall in this city is drawing huge crowds, despite Mr. Ford's clash with the NRA. It is perhaps the most elaborate exhibit ever staged in Detroit by a single manufacturer. A check-up of Ford's production in the last four months reveals that it was considerably larger than the trade had supposed. It was substantially as fol-

lows: June, 60,580 units; July, 61,122; August, 63,308; and September, over 60,000.

Plymouth is not maintaining its September rate during this month, but its assemblies should be from 20,000 to 25,000 units. Dodge is continuing to do unusually well. Sales of the Chrysler Corpn. in September totaled 53,985 cars and in the first nine months of the current year 387,266 units, a gain of 212,736 units over the corresponding period of last year.

Mr. Ford is reputed to have dispatched some of his men the past week to various sheet mills to look over the production processes with the plan in mind of erecting a sheet mill in connection with his steel plant at Dearborn. It is known that he has plenty of space alongside his plant to construct a mill if he so desires. The steel code specifically forbids the building of further steel making capacity, but a Ford sheet mill program would not be affected by this decree because the finishing capacity at Dearborn is less than the open-hearth capacity and the construction of a sheet mill in itself would not be adding to raw steel output. The steel trade is trying to make up its mind whether Mr. Ford is serious in his intention to make his own sheets or whether he is impressing on the steel industry in a sensational way his disapproval of recent price advances.

No volume buying of steel by the automotive trade is looked for until near the end of the year. This means that sheet and strip mills in particular will have to get their tonnage elsewhere than in Detroit for the next 60 days. Although new models are scheduled for a late start, the industry generally is extremely optimistic about 1934. An improvement of 50 per cent over this year is commonly accepted as a conservative estimate, bringing production next year to about three million units.

Some V-eight Fords are now being equipped with cast alloy iron crankshafts. Both the main and connecting rod journals are of about the same size as with the steel shaft. Cars having the new crankshaft are identified by a small copper tag attached to one of the cylinder heads. Plymouth is offering aluminum cylinder heads as optional equipment and for installation on cars now in the field. It is reported that William B. Stout head of the Stout Engineering Laboratories of this city and designer of the Pullman Co.'s railcar, will put on the market in small quantities next year a light automobile with independently sprung rear axle and engine located in the rear.

### Detroit Notes

At the Ford show the Briggs Mfg. Co. is displaying its all-steel "dream car," a radically streamlined passenger car designed for rear-engine construction. Seats are of the chair type modeled after the steel chairs made by Briggs. The car has a stabilizer fin at the rear similar to fins used on racing cars and airplanes. Running boards have been eliminated. On the top of the car is a periscope through which the driver can see what is behind him. Rear wheels are encased in so-called steel "pants," and front and rear bumpers are built into the body rather than projecting on racks as they do on present cars. It is believed that this type of car will be in production by 1935; if not then, surely by 1936. . . . Great Lakes Steel's bar and strip mills cleaned up their old orders last week and the sheet mills will finish up this week. . . . In its three lines to be introduced next month, Nash will abandon conservatism in favor of advanced streamlining, with parking lamps and tail lamps built into fenders.

## "Go to Work, Then Negotiate," Says Board to Detroit Strikers

WASHINGTON, Oct. 24.—Negotiations for settlement of the tool and die strike in Detroit, Flint and Pontiac, Mich., between the strikers and individual automobile manufacturers were arranged by the National Labor Board at a hearing held here last Wednesday.

It was attended by strikers, headed by Matthew Smith, president of the Mechanics Educational Society, and a group representing tool and die makers. No automobile manufacturers appeared, though Senator Wagner, chairman of the Board, has summoned Alvan Macauley, president of the National Automobile Chamber of Commerce and of the Packard Motor Car Co., and W. S. Knudsen, executive vice-president of the General Motors Corpn. Each telegraphed Senator Wagner that he could not speak for the whole industry and that his attendance therefore would be futile.

The tool and die makers' representatives who appeared before the board were C. C. Richards, Detroit, president of the Allied Products Corpn.; Roy Wise, Cleveland, secretary, National Tool, Die and Machine Institute; M. A. Woodworth, Detroit, president, Ex-Cello Tool & Die Co., and Chester Culver, secretary, Employers' Association of Detroit.

The plan for settling the strike called for return to work of strikers before the beginning of negotiations and was construed as a victory for the manufacturers. It proposed that the negotiations start with the automobile makers and later with jobbing plants which were doing work for the automobile plants when tool and die departments of the latter were hampered by the strike.

Both Mr. Richards and Mr. Wise are said to have told the Board that the question of arbitration was not a point in issue inasmuch as most of the strikers already had returned to work in Flint and that all of them had returned at Detroit, a statement strongly challenged by Mr. Smith.

Mr. Smith, speaking for a joint committee of striker representatives from the three affected areas, insisted that 17,000 men went on strike of which 14,000 were in Detroit, the total representing between 90 and 95 per cent of the tool and die makers in Detroit, Flint and Pontiac. Only the Ford plants, he said, were not involved in the strike. Tool and die makers told the board that when the strike was at its peak only 6300 men walked out in the Detroit district. They said no effort at collective bargaining was made by the men and that they had declined to agree upon conferences with manufacturers when asked to do so by John M. Carmody, member of the Labor Board.

Mr. Smith said that the big companies, referring to automobile makers, had declined but that the jobbers and independent tool makers had agreed to deal with the Mechanics' Educational Society. Jobbers and independent tool makers, he said, were prepared to grant demands of strikers as to wages and hours. But the strikers, he stated, were afraid the automobile manufacturers would turn their tool and die work over to jobbing plants and close their departments.

## Steel Construction Code Hearing Next Monday

WASHINGTON, Oct. 24.—Hearing on the code of fair competition presented by the American Institute of Steel Construction will be held next Monday before Deputy Administrator Malcolm Pirnie in the United States Chamber of Commerce building. The proposed code, previously published in detail in THE IRON AGE, fixes a basic maximum work week of 40 hr. with not more than 48 hr. or more than six days in any one week.

For the purpose of establishing minimum rates of pay per hour the code defines seven territorial districts and further provides that in the cities of New York, Chicago and Pittsburgh, the rates fixed shall apply to all plants located within a radius of 30 miles from the respective city halls. It is further provided that the rates per hour specified in other cities shall apply to plants located within a radius of 20 miles from their respective city halls.

THIS WEEK IN WASHINGTON

# President Prepares to Act as Strikes Continue to Tie Up Coal Operations

## *Failure of Miners to Return to Work in Western Pennsylvania and in Illinois Brings Out Threat of Administrative Action Against Labor for Code Violations*

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, Oct. 24.—President Roosevelt has not disclosed plans regarding settlement of the strike at the coal mines of the Frick Coke Co. That he has written to Myron C. Taylor, chairman of the United States Steel Corpn., and has received a reply has been made known. But what steps the President now has in mind remains unknown. Reports are current that Hugh S. Johnson, National Recovery Administrator, and his chief counsel. Donald R. Richberg, have devised a plan, but it is said that the President is hopeful that the situation can be settled to the satisfaction of both the Frick company and the miners.

Nevertheless, it is well known that the United Mine Workers of America are attempting to force recognition of the union against the stout resistance of the company. Speaking through Nathan L. Miller, general counsel of the American Iron and Steel Institute, steel companies in reply to a letter from President Roosevelt of Oct. 9, said they would accept the check-off to the extent of recognizing "voluntary orders for payments of any portion of the wages of any employee for dues to any organization of which he may be a member, to the extent that we are legally permitted to do so." On this basis the Frick company began negotiations with Philip Murray, vice-president of the United Mine Workers. The negotiations ended without the settlement of the strike. It is understood that enforced recognition of the union was asked. Thomas Moses, president of the Frick company, is reported to have attempted to negotiate the settlement in full compliance with promises made. However, John L. Lewis, president of the Union, was dissatisfied with developments, and last Thursday indicated that President Roosevelt would again have to intercede, as he has done. Mr. Lewis is said to believe that only "forceful" administrative action can bring the controversy to an end, and has made the charge that the captive mine owners declined to bargain in good faith with union representatives. The supposition is that "good faith" means recognition of the union. What forceful measures may be in mind were not revealed.

### Union Vs. Union in Illinois

COAL is heckling the Administration from another source, in Illinois, where union is fighting union, and where bloodshed has taken place. The Illinois trouble is of long standing and grows out of disputes between the United Mine Workers and the Progressive Miners' Union. Both unions have contracts with Illinois operators. The NRA is trying to leave settlement of the situation up to the Illinois State authorities, but indications are that it will come before the National Labor Board, of which Senator Wagner is head, adding to the many controversies now appearing before that body.

Mr. Richberg went to Illinois last week and reported on the coal strike situation and proposed a formula to General Johnson. It is his proposal that mines be operated under present labor contracts, that miners of the two unions be separated, or allocated, to mines made up entirely of their respective memberships and each be permitted to attempt increase in membership. While hoping that the State would take charge of the situation, it was proposed that, if necessary, disputes be referred to the National Labor Board.

### May Impose Penalties on Labor Violators of Code

FAILURE of settlement through the bituminous coal code, which provides machinery for adjusting labor disputes, Mr. Richberg said, carries penalties under the Recovery Act. His intimation was the first made that labor may have to be taken in hand and dealt with by the Federal authorities. Mr. Richberg said that "in the event of violations of requirements of the bituminous coal code or resistance to its enforcement, there are Federal remedies available to enforce the law and to prevent armed resistance to its enforcement." He pointed out, however, that it is the primary responsibility of the State to preserve law and order, but added that the State so far has been unable to do so with success, even though it had repeatedly called out the National Guard. How far the Administration may be prepared to proceed against labor for violations of codes remains to be seen.

Mr. Richberg's implied threat of action against labor at least created interest, whatever its significance, for the trend has been in the other direction. Threats heretofore have been directed solely against employers. They took an acute form in the President's order that Blue Eagle chiselers be punished by a fine of not to exceed

$500 or imprisonment for not to exceed six months or both. In view of the many complaints against such chiselers, the President's order met with widespread sympathetic response. For whatever the accomplishments of the NRA, it has shown a liberal attitude toward many signers of the Blue Eagle code, even when cases against them appear to have been strongly supported. The NRA has freely made concessions where it was shown that serious hardship was experienced by merchants and others who have signed. This, of course, is not to say that all of them have been relieved where easing of their situation is justified, but where the situation has been called to the attention of the NRA it has said it will show a cooperative spirit.

### Administration Baring Its Teeth

BUT as it moves more deeply into its administrative phase, the NRA finds itself face to face with growing complications. Administration officials say that they were to be expected. The fact remains that it is baring its teeth and is drawing its cudgels to check disturbances which it is increasingly anxious to bring to an end in order to clear the road to speed the recovery program on its way. For winter is near at hand and unemployment remains at an alarmingly high figure.

Patient and fair-minded as he is, even Senator Wagner has shown irritation over difficulties experienced in settling strikes through negotiations before the National Labor Board. He gave expression to his feeling in a radio broadcast last Wednesday night when he warned of sanctions for flouting Labor Board decisions, which, he pointed out, are an essential part of the recovery program. Mention was made of the licensing provisions of the Recovery Act. Both industry and labor were reminded of their responsibility.

"Any group which flouts decisions of the board may be placed under a code embodying the conditions approved by the board," said Senator Wagner. "If the code is violated the licensing provision and other penalties of the Recovery Act may be invoked. There will be no escape for the misguided minority."

Reference to the placing under a code any group which defies the board's decisions came at a time when reports were current that consideration is being given to placing organized labor under a code. The report went on to say that one provision would require organized labor not to attempt to force employees to join a union against their will. It is seriously doubted, however, that any such code is in prospect.

### Some Strikes Settled

DISAPPOINTED as it has been in some of its negotiations, the fact remains that the board has settled numerous strikes. Among the latest were strikes in the Westinghouse plants at East Springfield and Chicopee Falls, Mass. Gratification at "the spirit of cooperation and good will shown by both sides" was expressed by Senator Wagner. The terms called for return to work of the strikers yesterday and for collective bargaining by the company with representatives of employees selected according to provisions of the Recovery Act. The strike involves reclassification of occupations and rates of pay.

Other important strikes reported settled or objects of negotiation through the board include those in western Kentucky and Alabama coal fields and at the plant of the Art Metal Construction Co., Jamestown, N. Y.

Negotiations are said to be still under way at the plants of the Weirton Steel Co., where the Amalgamated Association of Iron, Steel and Tin Workers is demanding recognition. In the case of the tool and die makers' strike in the Detroit area, strikers were told to negotiate with individual automobile manufacturers, while Ford Motor Co. officials told the board they would negotiate directly with strikers at its Chester, Pa., and Newark, N. J., plants but, like automobile makers faced with the strike of tool and die makers, said they did not want the strikes arbitrated by the board. In these, as in other instances, the board was told there was nothing to arbitrate but that the men walked out without giving notice of their grievances. In virtually all instances the issue is the recognition of organized labor, though other points are made by strikers.

### Farmers Want a Code

THE most disturbing factor, however, has been the farmers' strike, a situation that called for a broadcast by the President Sunday night. Whether justified or not, much of the blame is laid on the NRA. Farmers, shouting for export and foreign import embargoes on agricultural products, for higher prices and for inflated currency, contend that the NRA activities have run up prices of products they buy, while farm prices continue to sag, and they want a code to get under the NRA umbrella. Moreover, they want more results from the public works program.

The AAA—Agricultural Adjustment Administration—has been outstripped by its initial brother under the driving force of the dynamic General Johnson. Hence the so-called revolt of the farmers, called for last Saturday by the National Holiday Farm Association, following a meeting of directors in St. Paul. Government loans were not what the farmers asked. They want a code. Seeing that most everybody uses one, they wish they had one, too.

Keith Neville, administrator for the NRA in Nebraska, turned his back on that organization. Gov. Charles W. Bryan turned to melodramatic phrase by saying farmers' throats are being "cut from both ears" by abandonment of the anti-trust laws and declining farm prices, and joined Senator Norris in urging currency inflation by retirement of Liberty bonds and payment of a bonus. Mr. Neville said mounting prices had produced virtually a buyers' strike among farmers and it would be an understatement to say farmers alone are complaining of mounting prices, because the forgotten man and the forgotten woman as well are joining in the chant.

The complaint perhaps can be stated in another way—that income is not keeping up with retail price increases. General Johnson has repeatedly warned of serious danger unless purchasing power reaches a parity with production.

### General Johnson's Rejoinder

THE National Recovery Administrator said that he had no quarrel with Mr. Neville for resigning, "as he announces himself out of sympathy with the manner in which the (NRA) program is being conducted in such States as Nebraska." The general explained that both Mr. Neville and Governor Bryan complain because they say the farmer is not getting the relief he expected under the Agricultural and the Recovery Act, and because the public works program is not in full operation.

"All of these are parts of the general program," said General Johnson. "That they have not all moved forward at the same pace is perhaps as regrettable as unavoidable. We must assume that all of the departments of the recovery movement are doing their utmost. When everything is in full swing I am quite sure that the farmers' discontent will vanish, for the national recovery movement was based on the theory of improvement in the condition of everybody.

"Such manifestations of impatience as the recent events in the Middle West are more or less natural. However, when the whole plan is in full operation I am quite sure that the forebodings expressed in the recent enunciations will prove unfounded."

---

## Machine Tool Activity Remains at High Level

ORDERS for machine tools are not declining appreciably, despite recessions in allied industries, according to the recent report of the National Machine Tool Builders' Association. The index of net orders for September was 54.9, against 57.2 in August and 52.8 in July. Shipments during September were 42.9, compared with 39.4 in August and 35.6 in July. Builders now have unfilled orders on their books in excess of 85 per cent of the 1922-24 average.

# Pros and Cons of Russian Recognition

## *Industrial Interest Centers Now On Impending Diplomatic Relations*

WASHINGTON, Oct. 24.—Prospects of large American sales of industrial and agricultural machinery, steel, automotive products, locomotives, cotton, cotton cloth and a long list of other lines are being freely forecast in the event the United States recognizes Soviet Russia. In some quarters sales to and purchases from Russia have been worked out to a nicety. Even the number of American workmen who will be returned to the payrolls has been carefully calculated.

On the other side of the picture are numerous important groups vigorously opposed to Soviet recognition who see little or no increase in trade with Russia through resumption of diplomatic relations. They point to heavy trading that has been done with Russia during the 16-year period of nonrecognition and attribute the sharp decline of the past several years to world-wide economic conditions and to more favorable terms granted to Russia by other nations than have been available from the United States.

Still another view is that there are no standards to go by. Merely compiling figures on exports and imports, it is contended, cannot set up a yardstick. The point is made that world conditions in commerce and finance have undergone and are undergoing such profound changes that the future is so uncertain as to place the question in the speculative field.

Potentially a large trade with Soviet Russia is held to be altogether conceivable. Assuming that internal conditions in that vast country provide economic stability, accomplishment of its industrial program may be realized. Mixed reports come from those who have been in Russia, some of whom have been engaged in enterprises there. Perhaps the outstanding impression is that while Russia has fallen far short of realizing its ambitious program, it has on the whole made considerable progress, much more than have many of the "capitalistic" countries, to use a favorite Soviet expression.

### Half Billion in Orders in Sight

The assumption here is that subjects prepared and statistics compiled by Washington and Moscow are simply a prelude to forthcoming negotiations between President Roosevelt and Maxim Litvinoff, emissary from the Russian foreign office. The material apparently is a mark to shoot at. Litvinoff is represented to be prepared to bring $500,000,000 worth of orders for the United States, and Washington is said to have prepared data showing annual export possibilities in excess of $100,000,000 in machinery, steel, rail equipment, cotton, cotton cloth. The Washington Government, too, has in its portfolio claims of more than $500,000,000 against Russia, the old Russia, that have not been and probably will not be recognized by the Soviet Russia. Yet this is not believed to be a real obstacle to the American-Russian negotiations. The Russian claims are only a bagatelle when measured against European debts, cancelled or defaulted in large part, with further cancellation or default likely. The matter of communistic propaganda likewise may be expected to be mentioned by the Washington Government with a promise that it will be prohibited.

The big thing is as to how Russia will pay for American goods. Neither the American Government nor its people stand ready to give American dollars to a foreign country to buy American goods. Giving of this kind has been a most costly experiment in building up false trade. But it is only fair to the Soviet government to say it has maintained a good credit record. Assurance that the Soviet will make good on a basis of long credit terms, which it has in contemplation, will be sought by Washington. Litvinoff has said that America will be given large Soviet orders "if reasonable credits are offered."

### Credit Will Have to Be Liberal

Whether or not there is agreement on what constitutes "reasonable credits," the implication is that the terms will have to be more generous than have been given in the past either by the United States Government or any of its corporations in dealing with Russia.

There are some government economists who think some business and agricultural interests have been overenthusiastic regarding the possible expansion of trade with Russia, provided recognition comes about. They discount considerably Russian estimates as to its trade developments and its promises for American orders and doubt that the credits which Russia may have in mind can be arranged. There are also officials who believe that trade between the countries will be largely a matter of exchange of American finished goods, with additions of cotton, for Russian products, mostly raw materials, including iron ore, manganese ore, wood pulp, and possibly lumber.

Protests already are being made against the possibility of increased receipts of Russian products, reminded of past efforts to get embargoes on Russian manganese ore, lumber, wood pulp and matches, partly on the ground that the Russian shipments were convict-labor products, banned under the tariff law. Dumping also was charged frequently. These protests are some of the manifestations that will stand alongside credit arrangements.

Important, too, are protests from such substantial bodies as the American Federation of Labor, the American Legion and religious groups, together with a section of political opposition. Inasmuch as it recently declared a boycott on German imports, it is likely that the American Federation of Labor will take like action with regard to Russian goods. The probable character of the latter, however, would not lend themselves as readily to a boycott as do German goods.

How far the Government may go in making direct loans to Russia is a question. American people look askance at such loans by reason of past experience, and also because of growing demand for Federal aid by the American Government for its own people in the present period of distress.

The comparatively recent loan by the Reconstruction Finance Corpn. of $4,000,000 to the Amtorg Trading Corpn. for the purchase of cotton for Russia is, of course, relatively small when compared with credits that Russia no doubt will ask. Moreover, while the Amtorg is a Russian trading organization it is a private corporation also, so that technically the loan was not made direct to the Russian Government. What part the Amtorg might play in the future loans for Russian trading is not known.

### Private Conferences Have Been Held

It is known that many conferences have been held during the past few months between American manufac-

turers and Government officials with regard to plans for building up trade with Russia. It is understood that one plan proposed the setting up of an American corporation or corporations which would provide satisfactory collateral and turn it over to the R.F.C. in return for loans. It is believed that this plan is being considered in connection with forthcoming negotiations with Russia, either to wholly or partially take the place of direct Government loans to Russia. Coupled with the plan also is said to be one for exchange of American finished products for Russian raw materials. There are reports current, also, that the Amtorg will be a prominent medium for trade with Russia and an unverified rumor is that negotiations already are well under way for a loan of $50,000,000 to the Amtorg.

The outstanding reason for the relatively large trade between Russia and foreign countries has been the attitude of the latter in providing Government guarantees. These are said to represent from over one-half to three-fourths of the value of the goods shipped to Russia. These guarantees are given by such countries as Germany, Italy, Norway and Sweden and were also given by Great Britain before the quarrel the latter country had with Soviet Russia recently, a quarrel that is being patched up with prospects of early resumption of British-Russian trade agreements. The credits are said to extend from one year to almost five years. Outstanding British credits, estimated at approximately $50,000,000, are said to have a limit of 18 months, while some German and Italian credits are reported to have been made on a four-year basis in most instances but in some cases to run almost five years. Whether credits of such duration can be arranged in the United States is an important factor upon which to determine the matter of Soviet recognition and hoped-for large increases in trade.

There will undoubtedly be opposition in Congress to Russian recognition, but it is believed it will not be sufficiently formidable to defeat President Roosevelt should he ask that recognition be granted.

# Truckers Protest Steel Code Delivered Price Clause

WASHINGTON, Oct. 20.—Request that provisions relating to delivered prices be eliminated from the steel code is made in a protest filed with the National Recovery Administration Oct. 13 by the American Trucking Associations, Inc. Directed to the attention of Deputy Administrator Kenneth M. Simpson, who had charge of hearings on the steel code of the American Iron and Steel Institute, A. Lane Cricher of the law firm of Brashears, Townsend and Cricher, says in the brief that the protested provisions are "unfair, prejudicial and discriminatory" and penalize the transportation of iron and steel by truck.

Especial attack is made upon an Institute resolution which permits a steel manufacturer to allow a reduction in the truck delivered price of steel equal to 65 per cent of the carload all-rail rate. The same question of delivered price provisions in the cement code has arisen and the trucking association has filed a brief in protest against provisions in that code also. It is charged that the provisions "smack of a resolution to use only railroads in the delivery of steel."

"When a steel salesman quotes prices from Pittsburgh (or other basing point) railroad freight charges may be allowed from the mill to the consuming point," the brief says, "but should the customer specify truck delivery the mill will only allow 65 per cent of the freight tariff charges. The remainder of the truck rate must be absorbed either by the customer or the trucker. The trucker cannot stand a 35 per cent cut below the rail rates. This affects also our local cartage members; they pick up steel from the local steel companies; the practice of which has been to allow the trucker or customer a 'switching allowance.'"

Reference to the "allowance" of railroad freight charges from the mill to the consuming point does not appear to be clear. The code provides, with certain exceptions, that all prices shall not be less than the sum of (a) the published base price and (b) the all-rail published freight charges from the basing point on which the base price is based to the place of delivery. This means that invoices, made on a delivered basis, carry the freight charge from the basing point nearest to the point of consumption. It has been pointed out that, therefore, there is no "allowance" of all-rail freight charges applying from the nearest basing point to the delivered point. However, it is necessary that if the steel is shipped from a mill at a greater distance than the nearest basing point to the consuming source the producer is required to absorb the freight differential.

The Institute resolution covering allowance for truck shipments, included in the brief, reads as follows:

"In any case in which any purchaser shall require that any product purchased by him from a member of the Code be delivered from the plant of such member by truck and such truck is provided, directly or indirectly, by such purchaser and for his account, such member of the Code may allow a reduction in the delivered price for such product otherwise chargeable under Section 4 of Schedule E of the Code equal to 65 per cent of the carload all-rail published tariff freight charges from the plant of such member of the Code from which such product was shipped to the place of delivery of such product by truck to such purchaser."

For example, and as a means of simplification, it has been explained that, assuming the base price is $100 and the all-rail rate is $10, the shipment would be invoiced at $110, delivered. But if shipped by truck, the reduction of 65 per cent of the all-rail rate would amount to $6.50, making a $103.50 price at the basing point and a truck-delivered invoice of $106.50, assuming the consumer could get truck delivery at $6.50. The brief makes no such assumption. Far from it.

It says:

"Where the receiver of a rail shipment pays the rail freight he is permitted to deduct this from the delivered price. Where the receiver trucks the steel product, the Institute, under the steel code, would and does grant only 65 per cent of the rail rate. In other words, the price of steel is higher to any consignee who elects to use motor truck transport. The public is left to pay higher steel prices. The consumer reaps no benefit from competition in the field of transport. The trucker is penalized for the benefit of the steel industry. Thousands of men are deprived of work because of trucks necessarily out of business. The only benefit comes to the steel group—larger profits through control of transportation and distribution."

The code resolution sets up a committee to study the problems presented in the cases of delivery by other than all-rail transportation and to recommend a complete plan of action in respect to truck transportation and the delivered prices involved.

The brief of the trucking association in protest of the cement code points out in detail how the delivered price provisions of the code are prejudicial, the same principles applying to the steel code. It is stated that an opinion of the Supreme Court of the United States, which is cited, holds that a one-price basis or f.o.b. basis is a fair basis of quotation of prices. The brief urges a steel mill basis of quotation.

These provisions of the steel and cement codes, it is charged, represent deliberate and unwarranted attempts on the part of one industry to regulate another through the medium of a code. The delivered price provisions, it is stated, in effect set the rates at which truckers should bid for hauling iron, steel and cement. These rates are considered to be prejudicial and confiscatory.

# ... PERSONALS ...

MARVIN E. COYLE has been named general manager of the Chevrolet Motor Co., Detroit, succeeding W. S. KNUDSEN, who has been appointed executive vice-president of General Motors Corpn., of which Chevrolet is a division. Mr. Coyle has been in the employ of General Motors since 1911, having been made auditor of the Oakland Motor Car Co. in 1914 and three years later comptroller of the Chevrolet company. In 1925 he was selected as assistant to the president and in 1929 was appointed vice-president and general auditor. At that time Mr. Knudsen established a rule that no major policy of the company was to be launched until it had Mr. Coyle's approval. From September, 1932, until February of this year Mr. Coyle had complete charge of the company due to Mr. Knudsen's illness. Among his duties the last few years has been the running of the Chevrolet commercial body plant at Indianapolis over which he had full control. He is 46 years of age.

HARRY J. KLINGLER has been appointed general manager of the Pontiac Motor Co., Pontiac, Mich. He has been vice-president and general sales manager of the Chevrolet Motor Co. since 1929. He has been in sales work since 1912 and for the past 10 years has been associated with the Chevrolet company. During the war he saw a year's service overseas with the Fourth Anti-Aircraft Machine Gun Battalion. He is an old associate of R. H. Grant, vice-president of General Motors, with whom he worked in Delco Light Co. and in Chevrolet.

HARLOW H. CURTICE has been appointed general manager of the Buick Motor Co., Flint, Mich., succeeding I. J. REUTER, who was general manager of both the Buick and Olds divisions of General Motors Corpn. He has spent practically all of his business life with the AC Spark Plug Co., division of General Motors, of which he has been president since 1929. He went with the AC company in 1914 as an accountant and a year later, when only 21, was made comptroller in recognition of his outstanding ability. In 1923 he was appointed assistant general manager, retaining his duties as comptroller. In that capacity he acquired a thorough knowledge of factory operations and plant management. In 1927 he assumed the position of vice-president and assistant general manager and two years later stepped into the presidency.

CHARLES L. MCCUEN has become general manager of the Olds Motor Works, Lansing, Mich., division of General Motors Corpn. Born at Stockton, Cal., in 1892, he worked his way through high school in San Francisco and graduated from Polytechnic College of Engineering in Oakland. After a short period as vice-president of the Cole California Motor Co., automobile manufacturer, he went into structural engineering and was the structural engineer for the Panama-Pacific Exposition in 1915. In 1916 he joined the engineering staff of the Packard Motor Car Co. in Detroit and in 1919 was made vice-president of the Isco Refrigerator Co., Detroit. Three years later he became an experimental engineer for the Rickenbacher Motor Co., remaining in that position until 1926 when he joined the engineering department of the Olds Motor Works. He designed several of the Oldsmobile engines and rose quickly to chief engineer, director of engineering and technical assistant to the general manager of the Olds and Buick divisions.

❖ ❖ ❖

CHARLES J. GRAHAM, formerly president of the Bolt, Nut and Rivet Manufacturers' Association, has become special representative for the Pressed Steel Car Co., with headquarters at the company's offices in the Grant Building, Pittsburgh. He was formerly vice-president of the Graham Bolt & Nut Co., Pittsburgh, which became a part of the Pittsburgh Screw & Bolt Corpn., Pittsburgh, in 1929. His new duties will be largely in connection with railroad sales.

❖ ❖ ❖

J. A. LONG, general manager, and NOEL BEDDOW, superintendent of blast furnaces, of the Woodward Iron Co., Woodward, Ala., have resigned. LEON EHRMAN, previously with the Sloss-Sheffield Steel & Iron Co., has been appointed furnace superintendent.

❖ ❖ ❖

W. K. LEACH, formerly identified with the General Alloys Co., Boston, has been made general manager of the alloy division of the American Manganese Steel Co., Chicago Heights, Ill. He will make his headquarters at the St. Louis plant of the company, 6600 Ridge Avenue.

❖ ❖ ❖

THOMAS F. MCLAUGHLIN, general manager for several years of the Baltimore works of the Rustless Iron Corpn. of America, has been elected vice-president in charge of operations.

❖ ❖ ❖

H. C. RYDING, retiring president, and ROBERT GREGG, the new president of the Tennessee Coal, Iron & Railroad Co., were honored at a dinner given Oct. 20 by the Birmingham Chamber of Commerce and attended by several hundred Birmingham business men. A dinner was also given for Mr. Ryding by officials and employees of the Tennessee company on Oct. 19. Mr. Ryding is scheduled to sail Oct. 25 on a trip to Europe.

❖ ❖ ❖

LOUIS STEINFURTH, formerly chief engineer and assistant manager of the Economy Machinery Co., Willoughby, Ohio, is no longer identified with the company.

M. E. COYLE

H. J. KLINGLER

H. H. CURTICE

C. L. McCUEN

# Production in Further Sharp Decline as Buying Reverts to Hand-to-Mouth Basis

## Accumulation of Stocks by Consumers and Cutting Off of Automobile Buying Are Important Market Factors—Rail Reduction May Release Railroad Tonnage

FOLLOWING the completion of shipments against third quarter contracts, steel buying has reverted to a hand-to-mouth basis. Consumers generally have built up their stocks and in some cases have enough material, at the present rate of operations, to last them through the fourth quarter. The growth of inventories has been accompanied by a slackening of consumption ascribable to seasonal influences or to labor disturbances.

Both factors have been at work in the automobile industry, where curtailment of output has been so sharp that the month's total will be nearer 130,000 than 145,000 units, as originally estimated. No volume buying of steel by the automotive trade is looked for until late in the year.

WITH support from the motor car industry cut off and with most other outlets of business less active, the industry is turning its attention from the intricacies of the national recovery program to problems of winter relief. It was doubtless with an eye to providing employment through the colder months that rail mills decided to accede to pressure for a reduction in prices at a time when their costs were mounting.

Throughout recent months the steel industry, as well as other manufacturing groups, have made sacrifices in the interests of the Government's anti-depression program, not only going into the "red" to carry out its provisions but submitting to constant harassment at the hands of organized labor. That the Administration is commencing to lose patience with union obstruction of recovery, especially in the coal fields, is indicated by an official reminder that labor is not exempt from penalties for code violations. A decision by the National Labor Board, directing striking Michigan tool and die makers to return to work and open up negotiations with individual companies, was a further sign that organized labor must temper its extreme demands. The tool and die makers' union had held out for negotiation with all manufacturers as a unit, regardless of whether shops were independent or parts of automobile companies.

A SUBSIDENCE of labor disturbances is essential, in the view of steel producers, to restore the confidence of investors in business enterprise. Until private capital can again be induced to flow into business, there must be continued dependence on Government spending. Purchases of 1,000,000 tons of rails and accessories, if authorized, will be largely financed by the Government. The first rail order, under the new price, is likely to come from the Norfolk & Western, which has tentatively placed 7500 tons with a Pittsburgh mill and 2500 tons with an Eastern mill.

Public works are likely to assume a more important place in coming months as projects authorized reach the contracting stage. Of 13,100 tons of fabricated steel placed during the past week, 10,600 tons was for public projects.

TIN plate remains the only really bright spot in the industry. In fact, tin mill output has been increased to practical capacity following the resumption of activity at the Weirton plant. Although the undiminished flow of tin plate specifications represents some stocking by consumers, the bulk of current shipments is going directly into consumption.

Declines in steel production during the week were sharp. The Chicago rate is off eight points to 37 per cent of capacity; Pittsburgh, four points to 30 per cent; the Valleys, seven points to 45 per cent; Cleveland, five points to 30 per cent; Buffalo, 13 points to 22 per cent; and the Ohio River district 15 points to 35 per cent. The Wheeling district rate, owing to resumption of operations at Weirton, has risen from 50 to 55 per cent. The national average for the week, as reported by the American Iron and Steel Institute, is 31.8 per cent, a drop of more than eight points from THE IRON AGE estimate of a week ago.

PRICES of finished steel, as reflected in THE IRON AGE composite, are unchanged at 2.036c. a lb., although next week they will reflect the rail reduction, which is effective Oct. 30. Sheet steel piling has been advanced $2 a ton to 2c. a lb., Pittsburgh, effective Nov. 1. An advance in bars is reported to be under consideration. THE IRON AGE pig iron composite is unchanged at $16.61 a gross ton, but the scrap composite, reflecting declines at Chicago and Philadelphia, has dropped from $10.54 to $10.25 a gross ton.

Ford representatives are inspecting sheet mills, presumably as a first step toward the erection of a sheet plant at Dearborn. Whether Mr. Ford is serious in his intention or is merely using a threat as a means of expressing his disapproval of recent steel price advances is not known. Likewise perplexing is the report that the four open-hearths at Dearborn are being warmed up in the face of fresh offerings of open-hearth scrap by Ford on the open market.

# ▲▲▲ A Comparison of Prices ▲▲▲

**Market Prices at Date, and One Week, One Month and One Year Previous**
**Advances Over Past Week in Heavy Type, Declines in Italics**

## Pig Iron

| *Per Gross Ton:* | Oct. 24, 1933 | Oct. 17, 1933 | Sept. 26, 1933 | Oct. 25, 1932 |
|---|---|---|---|---|
| No. 2 fdy., Philadelphia | $18.26 | $18.26 | $18.34 | $13.59 |
| No. 2, Valley furnace | 17.50 | 17.50 | 17.50 | 14.50 |
| No. 2 Southern, Cin'ti | 18.13 | 18.13 | 18.23 | 13.82 |
| No. 2, Birmingham | 13.50 | 13.50 | 13.50 | 11.00 |
| No. 2 foundry, Chicago* | 17.50 | 17.50 | 17.50 | 15.50 |
| Basic, del'd eastern Pa | 17.76 | 17.76 | 17.84 | 13.50 |
| Basic, Valley furnace | 17.00 | 17.00 | 17.00 | 13.50 |
| Valley Bessemer, del'd P'gh | 19.76 | 19.76 | 19.89 | 16.89 |
| Malleable, Chicago* | 17.50 | 17.50 | 17.50 | 15.50 |
| Malleable, Valley | 17.50 | 17.50 | 17.50 | 14.50 |
| L. S. charcoal, Chicago | 23.54 | 23.54 | 23.67 | 23.17 |
| Ferromanganese, seab'd carlots | $82.00 | $82.00 | $82.00 | 68.00 |

*The average switching charge for delivery to foundries in the Chicago district is 60c. per ton.

## Rails, Billets, etc.

| *Per Gross Ton:* | | | | |
|---|---|---|---|---|
| Rails, heavy, at mill | $40.00 | $40.00 | $40.00 | $40.00 |
| Light rails at mill | 32.00 | 32.00 | 32.00 | 32.00 |
| Rerolling billets, Pittsburgh | 26.00 | 26.00 | 26.00 | 26.00 |
| Sheet bars, Pittsburgh | 26.00 | 26.00 | 26.00 | 26.00 |
| Slabs, Pittsburgh | 26.00 | 26.00 | 26.00 | 26.00 |
| Forging billets, Pittsburgh | 31.00 | 31.00 | 31.00 | 31.00 |
| Wire rods, Pittsburgh | 35.00 | 35.00 | 35.00 | 37.00 |
| | Cents | Cents | Cents | Cents |
| Skelp, grvd. steel, P'gh, lb. | 1.60 | 1.60 | 1.60 | 1.60 |

## Finished Steel

| *Per Lb. to Large Buyers:* | Cents | Cents | Cents | Cents |
|---|---|---|---|---|
| Bars, Pittsburgh | 1.75 | 1.75 | 1.60 | 1.60 |
| Bars, Chicago | 1.80 | 1.80 | 1.65 | 1.70 |
| Bars, Cleveland | 1.80 | 1.80 | 1.65 | 1.65 |
| Bars, New York | 2.08 | 2.08 | 1.95 | 1.95 |
| Tank plates, Pittsburgh | 1.70 | 1.70 | 1.60 | 1.60 |
| Tank plates, Chicago | 1.75 | 1.75 | 1.65 | 1.70 |
| Tank plates, New York | 1.98 | 1.98 | 1.898 | 1.898 |
| Structural shapes, Pittsburgh | 1.70 | 1.70 | 1.60 | 1.60 |
| Structural shapes, Chicago | 1.75 | 1.75 | 1.65 | 1.70 |
| Structural shapes, New York | 1.95¼ | 1.95¼ | 1.86775 | 1.86775 |
| Cold-finished bars, Pittsburgh | 1.95 | 1.95 | 1.95 | 1.70 |
| Hot-rolled strips, Pittsburgh | 1.75 | 1.75 | 1.75 | 1.45 |
| Cold-rolled strips, Pittsburgh | 2.40 | 2.40 | 2.40 | 1.90 |

## Finished Steel

| *Per Lb. to Large Buyers:* | Oct. 24, 1933 Cents | Oct. 17, 1933 Cents | Sept. 26, 1933 Cents | Oct. 25, 1932 Cents |
|---|---|---|---|---|
| Hot-rolled annealed sheets, No. 24, Pittsburgh | 2.25 | 2.25 | 2.25 | 2.10 |
| Hot-rolled annealed sheets, No. 24, Chicago dist. mill | 2.35 | 2.35 | 2.35 | 2.20 |
| Sheets, galv., No. 24, P'gh | 2.85 | 2.85 | 2.85 | 2.85 |
| Sheets, galv., No. 24, Chicago dist. mill | 2.95 | 2.95 | 2.95 | 2.95 |
| Hot-rolled sheets, No. 10, P'gh | 1.75 | 1.75 | 1.75 | 1.55 |
| Hot-rolled sheets, No. 10, Chicago dist. mill | 1.85 | 1.85 | 1.85 | 1.65 |
| Wire nails, Pittsburgh | 2.10 | 2.10 | 2.10 | 1.95 |
| Wire nails, Chicago dist. mill | 2.15 | 2.15 | 2.15 | 2.00 |
| Plain wire, Pittsburgh | 2.10 | 2.10 | 2.10 | 2.20 |
| Plain wire, Chicago dist. mill | 2.15 | 2.15 | 2.15 | 2.25 |
| Barbed wire, galv., Pittsburgh | 2.60 | 2.60 | 2.60 | 2.60 |
| Barbed wire, galv., Chicago dist. mill | 2.65 | 2.65 | 2.65 | 2.65 |
| Tin plate, 100 lb. box, P'gh | $4.65 | $4.65 | $4.65 | $4.75 |

## Scrap

| *Per Gross Ton:* | | | | |
|---|---|---|---|---|
| Heavy melting steel, P'gh | $11.75 | $11.75 | $12.75 | $9.50 |
| Heavy melting steel, Phila | *10.00* | 10.25 | 10.75 | 7.25 |
| Heavy melting steel, Ch'go | *9.00* | 9.62½ | 9.62½ | 6.00 |
| Carwheels, Chicago | *9.50* | 10.00 | 10.00 | 7.00 |
| Carwheels, Philadelphia | 11.75 | 11.75 | 12.75 | 9.50 |
| No. 1 cast, Pittsburgh | 11.75 | 11.75 | 11.75 | 10.00 |
| No. 1 cast, Philadelphia | 11.50 | 11.50 | 12.50 | 9.50 |
| No. 1 cast, Ch'go (net ton) | *9.50* | 10.00 | 10.00 | 6.25 |
| No. 1 RR. wrot., Phila | 11.00 | 11.00 | 12.00 | 7.50 |
| No. 1 RR. wrot., Ch'go (net) | 7.75 | 8.50 | 8.50 | 4.50 |

## Coke, Connellsville

| *Per Net Ton at Oven:* | | | | |
|---|---|---|---|---|
| Furnace coke, prompt | $3.75 | $3.75 | $2.50 | $1.75 |
| Foundry coke, prompt | 4.25 | 4.25 | 3.25 | 2.75 |

## Metals

| *Per Lb. to Large Buyers:* | Cents | Cents | Cents | Cents |
|---|---|---|---|---|
| Electrolytic copper, refinery | 7.50 | 7.50 | 8.75 | 5.25 |
| Lake copper, New York | 8.00 | 8.00 | 9.00 | 5.75 |
| Tin (Straits), New York | *48.12½* | 46.75 | 47.20 | 23.50 |
| Zinc, East St. Louis | 4.75 | 4.75 | 4.75 | 3.00 |
| Zinc, New York | 5.12 | 5.12 | 5.12 | 2.37 |
| Lead, St. Louis | *3.90* | 4.10 | 4.35 | 2.90 |
| Lead, New York | *4.00* | 4.25 | 4.50 | 3.00 |
| Antimony (Asiatic), N. Y. | *6.75* | 6.87½ | 7.00 | 5.60 |

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

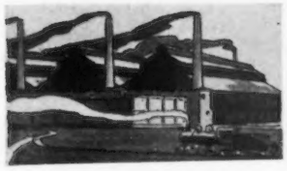
▲ ▲ ▲

# ▲▲▲ The Iron Age Composite Prices ▲▲▲

| | Finished Steel | Pig Iron | Steel Scrap |
|---|---|---|---|
| Oct. 24, 1933 | 2.036c. a Lb. | $16.61 a Gross Ton | $10.25 a Gross Ton |
| One week ago | 2.036c. | 16.61 | 10.54 |
| One month ago | 1.992c. | 16.71 | 11.04 |
| One year ago | 1.948c. | 13.59 | 7.58 |
| | Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output. | Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham. | Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago. |

| | Finished Steel High | Finished Steel Low | Pig Iron High | Pig Iron Low | Steel Scrap High | Steel Scrap Low |
|---|---|---|---|---|---|---|
| 1933 | 2.036c., Oct. 3 | 1.867c., Apr. 18 | $16.71, Aug. 29 | $13.56; Jan. 3 | $12.25, Aug. 8 | $6.75, Jan. 3 |
| 1932 | 1.977c., Oct. 4 | 1.926c., Feb. 2 | 14.81, Jan. 5 | 13.56, Dec. 6 | 8.50, Jan. 12 | 6.42, July 5 |
| 1931 | 2.037c., Jan. 13 | 1.945c., Dec. 29 | 15.90, Jan. 6 | 14.79, Dec. 15 | 11.33, Jan. 6 | 8.50, Dec. 29 |
| 1930 | 2.273c., Jan. 7 | 2.018c., Dec. 9 | 18.21, Jan. 7 | 15.90, Dec. 16 | 15.00, Feb. 18 | 11.25, Dec. 9 |
| 1929 | 2.317c., April 2 | 2.273c., Oct. 29 | 18.71, May 14 | 18.21, Dec. 17 | 17.58, Jan. 29 | 14.08, Dec. 3 |
| 1928 | 2.286c., Dec. 11 | 2.217c., July 17 | 18.59, Nov. 27 | 17.04, July 24 | 16.50, Dec. 31 | 13.08, July 2 |
| 1927 | 2.402c., Jan. 4 | 2.212c., Nov. 1 | 19.71, Jan. 4 | 17.54, Nov. 1 | 15.25; Jan. 11 | 13.08, Nov. 22 |

# Steel Business Falls to Low Level at Pittsburgh



## Stock Accumulations by Buyers Preclude Early Recovery of Demand — Ingot Rate Off Four Points to 30 Per Cent of Capacity

PITTSBURGH, Oct. 24.—Steel mill activity continues to lag with the gradual diminution of backlogs. Unfilled steel tonnages for delivery by the end of the year are in most cases disappointingly small. Prospects for sustaining even the current reduced rolling schedules are clouded somewhat by the restricted character of spot business. With few exceptions mills have completed shipments against third quarter commitments, and present rolling schedules are based almost entirely on fourth quarter and spot obligations.

An independent mill in this district is reported to have taken off all its open-hearths until accumulation of orders justifies resumption. Ingot output in the Pittsburgh district has dropped further during the past week and, at 30 per cent of capacity, is four points lower than that a week ago. As a result of accelerated operations at the Weirton mill, production for the Wheeling district is about five points higher at 55 per cent. Output in the valleys and nearby northern Ohio mills has dropped seven points to 45 per cent.

The present limited demand for steel, although ascribable partly to lack of specific business prospects among consuming industries, is also attributable to heavy consumer stocks built up as a result of generous specifications against low-priced third quarter contracts. Motor car makers specified very freely against old orders, and little support for steel products can be expected from that important quarter for another month or six weeks.

Filing of a new rail price of $37.75 a gross ton may smooth the way for early action on the much-heralded rail purchasing program. Quotations reflecting an increase of $2 a ton have been filed on steel sheet piling. An advance in the price of hot-rolled steel bars is believed to be under consideration.

Raw materials markets are depressed by reduced mill activity. The merchant pig iron stack at Sharpsville, Pa., has been blown out for an indefinite period. Scrap is at a virtual standstill, with prices nominally unchanged. Coal and coke offerings are more readily available but very little tonnage is moving.

### Pig Iron

Demand is practically dormant. Small spot orders are very infrequent, with forward interest entirely absent. The dearth of new business is resulting in general accumulation of stocks at furnaces in the district. The merchant producer at Sharpsville has blown out its stack for an indefinite period. Maximum tonnage on old contracts, which must be completed by Dec. 31, is expected to be specified in most cases. Quotations are unchanged. Talk of higher prices persists, but no action in that direction is expected to be taken until the recent increases in fuel prices are directly reflected in higher pig iron producing costs.

### Semi-Finished Steel

Pressure for shipments has relaxed further, except in the case of tin plate mills which still are the most active takers of sheet bars. Wire rods continue to be in favor. Other semi-finished products, however, reflect reduced rolling schedules that have generally been in effect at non-integrated mills since the midde of the month. Prices are unchanged for fourth quarter, with billets, slabs and sheet bars at $26; forging billets at $31, and skelp at 1.60c., all based at Pittsburgh or Youngstown.

### Bolts, Nuts and Rivets

The recently advanced prices are now being quoted for shipment from Nov. 1 to Dec. 31 on all business not covered by contract through October. New buying is very light, but specifications against existing contracts are in better evidence, probably because of the higher prices to become generally effective on Nov. 1.

### Bars

New business has fallen off considerably in the past week, and producers are rolling chiefly against orders placed before the first of the month. Backlogs are gradually being whittled down, and no specific prospects for immediate support from major bar consumers are discernible at the moment. The automotive industry is temporarily an unimportant factor in the current market. Cold-finishers generally covered for their fourth quarter needs at the old price, and very little demand emanates from that source. Miscellaneous demand offers no exception to the general trend. With business volume shrinking and producing costs mounting, a further advance in the price of hot-rolled bars is reported to be under consideration. Reinforcing bars are being figured almost entirely for Federal and State work, but the tonnage requirements for such projects cannot yet be considered significant.

### Plates and Shapes

Bids will be taken until Oct. 31 by the United States Engineer Office at Memphis on 48 pontoons, which will require about 900 tons of fabricated plates. Otherwise the market is devoid of important inquiry. Demand from private barge yards continues to be negligible. Tank work is also extremely light. No expansion in railroad requirements can be noticed.

Recent structural steel inquiries are disappointingly small. Projected river lock construction offers the brightest immediate prospect for tonnage, but Federal releases on the whole are not reflecting much advantage to structural mills. State bridge construction continues to predominate. Private work is very scarce.

### Rails and Track Accessories

Rail producers have filed a new price of $37.75 a gross ton, representing a reduction of 10c. per 100 lb. from the present price of $40 a gross ton. The new quotation, which was filed on Oct. 21, will become effective on Oct. 31. The Norfolk & Western, which opened bids last week on 10,000 tons of rails, is reported to have placed tentatively 7500 tons with the local producer, and 2500 with an Eastern mill. It is believed, however, that definite awards may be deferred in view of the action of the rail makers in filing revised quotations. Purchases of track accessories inquired for by the Norfolk & Western in conjunction with the rails may likewise be held in abeyance. Demand for track spikes and tie plates in other directions is restricted to scattered small lots. No immediate purchases of accessories are considered likely until the rail situation has been definitely lined up.

### Steel Sheet Piling

Filing of prices at $2 a ton above present schedules will establish quotations on Nov. 1 at 2c. a lb., Pittsburgh, and 2.10c., Chicago.

### Wire Products

Federal inquiry for woven wire fencing and wire nails for various projects has stimulated interest in this market. The bulk of this demand originates at Civilian Conservation Corps camps and other Governmental units throughout the country. No significant requirements from the agricultural districts are expected to appear before the turn of the year. Manufacturers' wire is quiet, and is chiefly under the influence of delays in production of new motor cars.

Prices are unchanged, with bright wire quotable at 2.10c., and spring wire at 3.10c., Pittsburgh and Cleveland. Wire nails are quoted at $2.10, base, per keg, Pittsburgh.

### Sheets

Sheet mill operations are beginning to reflect the adverse reaction of greatly reduced backlogs, and do not average more than 40 per cent of capacity. Fresh demand from all sources is very limited. Heavy acceptances against third quarter contracts have undoubtedly built up ample stocks in consumers' hands, and, in view of the general lagging tendencies in consuming industries, further important covering is not considered imminent, at least for the next month or six weeks. Prices on all grades of sheets are unchanged for delivery through the quarter.

### Strip Steel

With third quarter contracts practically completed, strip mills are in most cases scaling down operations in line with depleted order books. Current operations average around 45 per cent of capacity. Very little tonnage is moving to the automotive industry, and shipments to miscellaneous consumers are sporadic. Hot-rolled strip is quotable at 1.75c., and cold-rolled strip at 2.40c., Pittsburgh or Cleveland, for delivery through December. Fender stock is posted at 3.10c., Pittsburgh or Cleveland, for similar delivery.

### Tin Plate

Resumption of virtually normal schedules at the Weirton mill has lifted operations for the tin plate group to practical capacity. Although the undiminished flow of specifications reflects some stocking by consumers, the bulk of current shipments is reported to be going directly into consumption. Very little spot business is being attracted by the present price of $4.65 per base box.

### Cold-Finished Steel Bars

Consumer interest continues to be meager. The automotive industry is particularly lagging as a consuming factor, while miscellaneous demands are unimportant from a tonnage standpoint. The 1.95c., Pittsburgh, price is still applicable to shipments through the quarter.

### Tubular Products

This market is featureless. Demand during October has fallen slightly below that in September. Jobber positions are still long, and the railroads are buying only for imperative replacements. Scattered lots of welded pipe are being inquired for in conjunction with public works construction, but this tonnage is in minor volume.

### Coke and Coal

Recent establishment of higher prices has not encouraged buying. Coke consumers are evidently well covered for their early needs and are ignoring their future requirements. Consequently, with coke production increasing, more frequent offerings are not finding ready acceptance. Quotations on standard furnace and foundry coke are nominally firm and unchaged. High-volatile coking coal is in better demand but is relatively scarce. A large-lot inquiry for that grade has not yet been satisfied. Ordinary steam coal is being neglected. Coal prices are unchanged.

### Scrap

With consumption narrowing in line with generally reduced mill schedules, movement of scrap is extremely irregular. Except for the Weirton mill, which has issued partial releases against orders, and another mill in the Pittsburgh district, which is taking No. 2 bundles, consumers have practically shut off deliveries. Brokers' orders are practically bare of sizable tonnages, and no fresh bookings of consequence have been made in the past week. All grades of scrap are quotably unchanged, with heavy melting steel at $11.50 to $12, blast furnace grades at $8 to $8.50, and heavy breakable cast at $10.50 to $11.

## New England Looks for Upturn in Iron Buying

BOSTON, Oct. 24.—Pig iron sales for the week exceeded 1000 tons, with deliveries ranging from prompt to December. This showing is somewhat better than the previous week. Furnace representatives look for an increase in demand for fourth quarter delivery, although it is admitted the New England melt is slipping in all States except Connecticut. However, most of the smaller melters have taken all of their contract iron and will be forced to buy additional metal sooner or later. Prices remain unchanged.

With scrap shipments to the Pittsburgh territory stopped, and purchases by the American Steel & Wire Co., Worcester, Mass., rather limited, there is not much chance for local brokers to do business. Transactions are largely confined to occasional cars of cotton ties, steel turnings, shafting, bundled skeleton, breakable cast and engine blocks. The Worcester consumer is taking small tonnages of No. 1 heavy melting steel. Offers made here for this scrap at $10 a ton, delivered Eastern Pennsylvania, have found few takers.

The administration at Washington continues to allot large sums of money for various New England projects, but actual construction in almost all cases has not started, nor have bids been asked. Municipal and privately financed projects are handicapped by the lack of funds, banks so far not being disposed to make loans. As a result, construction work of all kinds is decidedly backward.

## St. Louis Market Is Apathetic

ST. LOUIS, Oct. 24.—Buying of pig iron continues on an extremely light basis, which is expected to continue throughout the remainder of the year. It is estimated that three-fourths of the tonnage likely to be consumed during this quarter is under cover, and other requirements are being bought in lots of a carload up to 200 tons as needed. Shipments have fallen off, as was to be expected, because of the rush for iron against contracts which expired on Sept. 30.

The trade in finished iron and steel is inactive, as most users bought before the advance in prices. Warehouse prices have been readjusted, most items upward, under the new code basis, prices here being the Chicago quotation, plus the spread plus the l.c.l. freight rate from Chicago here.

The scrap market is weak as the result of a lack of purchases by the mills, and dealers have reduced their buying prices. Selected heavy steel and No. 1 railroad wrought are 75c. a ton lower. No. 1 heavy melting, miscellaneous standard section rails, rails for rolling, cast-iron car wheels, No. 1 machinery cast and stove plate are 50c. a ton less, and No. 2 railroad wrought is down 25c a ton. Dealers report that very little distress scrap is available. Railroad lists: Missouri Pacific, 20 carloads, and Mobile & Ohio, 30 to 40 carloads.

## Reinforcing Steel

### Awards 3955 Tons—New Projects 3300 Tons

**Buffalo,** 2400 tons, storm drain sewer, to Kalman Steel Corpn.

**Niagara Falls, N. Y.,** 500 tons, substructure for Grand Island bridges, to Kalman Steel Corpn.

**Ontario County, N. Y.,** 125 tons, road mesh, to American Steel & Wire Co.

**Peoria, Ill.,** 300 tons, distillery, to Kalman Steel Co.

**Apache and Navajo Counties, Ariz.,** 119 tons, two State bridges, to unnamed bidders.

**State of California,** 171 tons, highway work in six counties, to unnamed bidders.

**Los Angeles County, Cal.,** 217 tons, material for San Gabriel dam No. 2, to Soule Steel Co.

**State of Washington,** 117 tons, bridges in three counties, to unnamed bidders.

#### NEW REINFORCING BAR PROJECTS

**Arlington-Cambridge-Belmont, Mass.,** 150 tons, State road.

**Cleveland,** 2400 tons, sludge digesting tanks for Easterly sewage disposal plant, previously reported as 1000 tons; bids to be taken Nov. 2.

**Onalaska, Wis.,** 350 tons, Mississippi River Lock No. 7; bids close Nov. 3.

**State of Colorado,** 100 tons, highway work in five counties; bids under advisement.

**State of Montana,** 215 tons, highway work in eight counties; bids Oct. 28.

**San Bernardino County, Cal.,** 122 tons, State paving, general contract awarded.

**Hamilton Field, Cal.,** 932 tons, Barracks and Quarters; bids under advisement.

# Downtrend More Pronounced in Chicago District

## Steel Output Off Eight Points to 37 Per Cent of Capacity—Further Recession in Scrap Prices

CHICAGO, Oct. 24.—Most factors in the local iron and steel markets are unfavorable and the best that can be hoped is that they portray only the short-range viewpoint. Ingot output has fallen eight points to an average of 37 per cent of capacity. Specifications continue to drop and still lower production seems unavoidable, with the only real stop-gap in sight the prospect of orders for rails. The rail price at Gary is $37.75 a ton. A lull has followed this announcement and it is not at all certain that the cut in price has met the expectations of either the Government or the railroads.

Fourth quarter coverage on all major iron and steel products has been light and new buying remains dull, with the result that order books are extremely light. From all indications automobile manufacturers are not making the progress expected with the new models. Strikes, radical departures in design and a growing tendency to give closer attention to what the consumer market will bear, all tend to point to resumption of activity somewhat later in the fall than had been expected.

### Pig Iron

Shipments of Northern foundry iron are close to a parity with September. Old contracts are being carried through to Dec. 31, and so there has not been the rush to specify, such as was experienced by the steel mills. New sales are small, being confined to a few carloads here and there. Under the old order forward contracting would now be under way. As matters now stand, sellers have some concern as to the volume of business that will be done in January. It can be a very flat month unless the melt shows a favorable turn. Some manufacturers' foundries are doing better, but jobbing units are operating at about 50 per cent of their summer peak.

### Reinforcing Bars

Releases of reinforcing bars for road and bridge work have helped shops, some of which have recently attained operations as high as 50 per cent of capacity. Most of this business has come from States north and west of Illinois. Road work will soon be discontinued on account of cold weather and fabricators expect shipments will drop. Illinois has opened bids on 350 tons, and Michigan, Wisconsin and Indiana are all in the market.

### Cast Iron Pipe

The only active job of size in this territory is the project at Green Bay, Wis., on which bids were opened on the 25th of the month. Government-aid work is slow in materializing, and much of it will be held over until spring so far as the actual shipment of pipe is concerned. Some work may be done on a few jobs that are now well advanced, but near Chicago and farther north even this will depend on whether or not the weather remains open longer than is usual.

### Rails and Track Supplies

Rail prices have been reduced to $37.75 a ton, but no action has yet been taken by the railroads to place orders. In fact, there are no direct inquiries before Chicago mills. There appears to be an understanding that the new rail price will not only cover new purchases, but also recent orders placed at the $40 quotation.

In track accessories, specifications and new buying are undiminished in volume, indicating that track work is still being done on the limited scale that has prevailed during the last month or two. Transactions in light rails are confined to an occasional small lot.

### Wire Products

Output continues to drop and now ranges from 40 to 45 per cent of capacity. Business has failed to develop in rural districts and in the Northern part of the country will not materialize this year for the reason that cold weather, which prohibits outdoor work, is very near at hand. Dissatisfaction among Middle-Western farmers is growing rapidly and to date no effectual means have been found to combat this unrest.

### Cold-Rolled Strips

New buying is small and fresh specifications are measurably lighter. Output has dropped sharply to a few points above 50 per cent of capacity.

### Plates

Local mills have booked several hundred tons of car repair material, and it is expected that 2000 to 3000 tons will be purchased in the near future. New railroad equipment programs are lagging, though from time to time there are reports that some plans are well advanced. A few small brewery projects are up for bids.

### Structural Shapes

Awards have been swelled by 5000 tons for a machine shop at the Bremerton, Wash., Navy Yard. Outstanding among fresh inquiries is a hospital at New Orleans, which calls for 10,400 tons, and a railroad bridge in Louisiana, which will take 3800 tons. Inquiries total 19,000 tons, including State bridge work in a half dozen Central Western States.

### Bars

General demand for bar mill products is lower, but it is still spread over a wide field of users. The sharpest drop has been in the demand from automobile manufacturers, who, in making changes from previous designs, are confronted with experimental work which is retarding their programs. The farm implement industry remains quiet, though one large farm machine producer is now arranging for steel needs to carry on operations primarily intended to furnish employment during the winter months. This program will be under way early in November.

### Coke

November prices will probably be announced about the first of the month. Three tons of coal are required to make two tons of coke and prices of coal under the NRA have advanced 75c. a ton to $1.85, depending on the grade. It is roughly estimated that the cost of producing a ton of coke has been raised $2 a ton under the NRA and so far sellers have raised prices only $1 a ton. This situation gives a definite clew to the drift of coke prices. October shipments are 10 per cent below the total in September.

### Scrap

Heavy melting steel has sold off 50c. to $9.25 a ton and all other grades have declined correspondingly. The new prices have not solidified at the new levels and most dealers look for a still lower market. Ingot output is off sharply and acceptances by mills have been cut materially in the last few days. The fact that local railroads are holding about 75,000 tons of heavy melting steel, all prepared for the market, gives further indication that the price structure is vulnerable. Brokers find they can buy heavy melting steel freely at $9 a ton, delivered, and some tonnage is changing hands at still lower figures. A boatload of busheling will leave Chicago this week for a Lake Erie port. The season is well advanced and it is doubtful if another water shipment will be made this fall. The Elgin, Joliet & Eastern is offering 5000 tons.

# Finished Steel Market Slow in Eastern Pennsylvania

## Mill Operations Hold, Although Backlogs Are Diminished — Pig Iron Shipments Steady—Warehouse Demand Maintained

PHILADELPHIA, Oct. 24.—With demand for heavy steel products still lacking in this district, orders in general are unusually light and production is barely holding its own at about 27 per cent of capacity. Steel companies have reduced rail prices to $37.75 in a move to obtain government-financed orders for 844,000 tons, but demand for other forms of steel from the carriers continues to be absent. It is now believed that significant freight car purchases will be deferred until 1934 and that repair parts will have to constitute the bulk of equipment business from the railroads this quarter.

Structural steel inquiry is reported to be even lighter than was the case in September. A high school at Wilmington, Del., will require 1000 tons, but other new projects generally call for 200 tons or less. Plate mills are occupied at a better rate than other finishing units, but new orders are scarce and backlogs are being depleted. Demand for sheets and strip steel is particularly light.

### Pig Iron

The most that can be said for this market is that shipments are fairly well maintained and that foundry melt in the district has not declined appreciably. New buying is very light and major consumers are generally covered for the remainder of the quarter. Bids have been taken by the City of Mexico for 25,000 tons of large diameter cast iron pipe, but if American producers share in this business, it is likely to go to the Birmingham district. Reports of an advance in pig iron prices persist, but no change will be made until fuel costs are definitely determined.

### Bars, Plates and Shapes

Heavy hot-rolled steel continues to be very quiet. Structural steel fabricating shops have little business on their books and leading shape mills have scarcely any backlogs. Plate units are fairly well engaged and in some instances are rolling steel for the Naval cruisers awarded recently. Much of this material will not be called for before the middle of next year. Reinforcing bars are in fair demand for road building, but merchant bars are extremely quiet. A high school at Wilmington, Del., will require 1000 tons of structural steel, but other projects financed in whole or in part by the Public Works Administration are slow to come out.

### Sheets

With the largest consumer of automotive sheet steel covered for the remainder of the year, small users are not taking sufficient tonnage to maintain any activity in the market. Warehouses seem to be well covered and manufacturers of radios are not in the market. Some users do not have contracts this quarter, having supplied their fourth-quarter needs prior to price advances.

### Warehouse Business

Shipments of steel products out of warehouse this month compare favorably with the corresponding September period and some jobbers report increases. New prices are now generally established.

### Imports

The following iron and steel imports were received here last week: 3600 tons of iron ore from Brazil; 2000 tons of manganese ore from British West Africa and 6 tons of the same product from Germany; 351 tons of pig iron from British India and 200 tons of the same product from England; 31 tons of steel bands, 30 tons of structural shapes and 20 tons of steel bars from Belgium; and 17 tons of steel tubes, 9 tons of steel rods and 8 tons of steel bars from Sweden.

### Scrap

Small sales of No. 1 heavy melting steel at $10 a ton have established the market at that level, although purchases have not been in significant quantities. Consumers show little interest in forward commitments and recent declines in production at various plants have made stock piles seem relatively larger. Prices on the other grades of scrap are largely nominal, as many quotations have not been tested in more than a month.

## Further Decline in Output at Buffalo

BUFFALO, Oct. 24.—The Lackawanna plant of the Bethlehem Steel Corpn. has reduced its open-hearth operations to three, and so has the Republic Steel Corpn. Wickwire-Spencer Corpn. continues with two open-hearths, and the Seneca sheet division of Bethlehem has decreased operations from 60 to 50 per cent of capacity. A local maker will fabricate 225 tons of structural steel for a State highway bridge in Steuben County, and another contract for 500 tons of bars for the substructure of one of the Grand Island bridges will be fabricated here.

The pig iron market is quieter. Shipments are holding up, but there is very little selling. The 1000-ton inquiry and the 800-ton General Electric inquiry mentioned in the past two weeks do not seem to have been placed. While there has been some interest in first quarter requirements, furnaces have not sold for this delivery and probably will not quote till about Dec. 1.

Scrap has again weakened. One mill bought 1000 tons of No. 1 heavy melting steel and No. 2 heavy melting steel at $9.25 and $7.75 respectively, and another lot of 1200 tons of the same grades at $9 and $7.50. The great preponderance of this material consisted of No. 2 heavy melting steel. A few hundred tons of stove plate have been sold at $9.25.

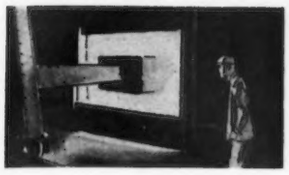
## Canadian Steel Output on 50 Per Cent Basis

TORONTO, ONT., Oct. 24.—Operations in the Canadian iron and steel industry are holding at a steady rate, with mills on a basis of approximately 50 per cent and foundries and other plants at 25 to 30 per cent. The Dominion Steel & Coal Co., Sydney, N. S., started rolling a 36,000 ton rail order for the Canadian National Railways during the week. It is believed the order will keep the mill in operation until the end of the year. General Motors Corpn. of Canada announced that work is now getting under way on new car models for next year.

Pig iron demand is fair, although no large tonnages have been included in recent orders. Sales are averaging approximately 500 tons per week, made up of single car lots. There is no competition in the Canadian markets from outside producers. Prices are firm and unchanged.

Scrap demand shows little change from the previous few weeks. Export business is dropping and it is reported that shipments to Britain of heavy melting steel will be suspended with the close of St. Lawrence navigation. Canadian mills are not in the market insofar as dealers are concerned, but are picking up steel scrap from railroads. Dealers' yards are heavily stocked with steel grades, but some iron lines are scarce. Dealers' buying prices are unchanged.

# Steel Output in Sharp Drop at Cleveland



## Rate Falls Five Points to 30 Per Cent of Capacity—Sewage Project Calls for 3700 Tons of Steel

CLEVELAND, Oct. 24.—New demand for finished steel is very light and orders are mostly for carloads or smaller lots. Consumers generally have good stocks which were accumulated in orders against third-quarter contracts and with the present rate of operations most consuming plants are believed to have enough steel in stock to last them several weeks. The automotive industry is placing piecemeal orders, and a revival of the demand from this source is not expected until the motor car manufacturers are ready to buy round tonnages for their new models. With shipments against third-quarter contracts completed, backlogs have been sharply reduced and finishing mill operations are being curtailed.

Ingot output has again declined, being at 30 per cent of capacity in the Cleveland-Lorain territory, a loss of five points for the week.

Public work is attracting an increasing amount of attention from steel makers, now that many Federal projects have approached the award stage. Locally new Federal-aided work has come out requiring a substantial tonnage.

The only effect that the reduction in rail prices may have in this territory will be to bring out some orders for next year that might otherwise be deferred several months. The only other price change is an advance of $2 a ton on sheet steel piling to 2c. a lb., Pittsburgh, effective Nov. 1.

### Pig Iron

The market continues dull with sales only in small lots. The motor car industry is not taking very much iron against contracts, as foundries in this field have not yet got under production on castings for new models. Shipments to consumers in other fields are holding up fairly well. Foundries making heating equipment continue to take shipments in liberal quantities.

### Sheets

There is little new business, as many consumers accumulated such large stocks that they will need few additional sheets during the current quarter. The automotive industry has not yet come into the market for substantial tonnages for its new models. Demand from the refrigerator industry took a slight spurt during the week due to the development of some new demand for refrigerators for the holiday trade. The steel barrel industry continues to operate well.

### Strip Steel

Some of the manufacturers of automobile parts placed fair specifications for both hot and cold strip during the week against orders taken for November requirements since the price advance. Most consumers in other fields have good stocks taken at old prices and there is very little new demand.

### Rails

The $2.25 per ton reduction in the price of standard rails to $37.75, which becomes effective Oct. 30, is expected to bring out some rail tonnage for 1934 from railroads having headquarters here. Most of the rails ordered by these roads for 1933 have been shipped, although shipments against these orders will not be completed until in November.

### Bolts and Nuts

The price advance has caused some stimulation in orders from consumers covered at the old prices, as these orders must be in not later than Oct. 31. However, the demand this month shows a falling off as compared with September. Very little business is coming from the motor car industry. Demand from railroads is fair.

### Bars, Plates and Shapes

New steel requirements have come out in connection with the Easterly sewage disposal plant in Cleveland. Sludge-digesting tanks, for which bids will be taken Nov. 2, will require 3700 tons, including 2400 tons of reinforcing bars, 1140 tons of plates, 100 tons of structural steel and some miscellaneous material. There will be 12 steel tanks, each taking 95 tons of plates. While there is little new inquiry for structural steel in this territory, fabricators in this district are figuring on considerable public work in other parts of the country.

### Coke

Connellsville district producers have announced a differential of 40c. a ton for shipment in box cars instead of open-top cars. An advance of $1 a ton to $5.25 has been made on premium Connellsville foundry coke covered by contracts having a wage clause. For new business this brand is now quoted at $5.50.

### Scrap

Shipments to some of the Valley district mills have been further curtailed as plant operations have declined. There is no local demand for steel-making scrap, as one consumer is taking only blast furnace grades. Dealers have very little tonnage of unshipped scrap on their books. Prices are unchanged but weak.

---

# Structural Activity Is Feature on Coast

SAN FRANCISCO, Oct. 23.—Work on the $3,000,000 construction program for Hamilton Field was started with the opening of bids for three barracks buildings and 25 officers' quarters, which will require 932 tons of reinforcing steel. Bids have been called for hangars and other structures that will involve considerable tonnage.

The two outstanding structural awards of the week went to the McClintic-Marshall Corpn., which booked 3600 tons for a machine shop at the Puget Sound Navy Yard and 942 tons for the Navy assembly shop at San Diego. An aggregate of 5807 tons of structural steel were let during the week. Reinforcing bar awards totaled but 683 tons.

Among new inquiries reported during the week are 2750 tons of cast iron pipe for Los Angeles and 1600 tons for Long Beach. New projects will require 517 tons of structural steel and 1484 tons of reinforcing bars.

At San Francisco the warehouse schedule was changed so that the call and delivered prices are the same. However, this does not apply on reinforcing bars.

---

# Pipe Lines

**Denham Springs, La.,** plans natural gas welded steel pipe line from Baton Rouge, La., where connection will be made with trunk system of Southern Gas & Fuel Co., to Denham Springs and vicinity. Bond issue of $45,000 will be arranged. Line will be extended later to Millersville and Harelson, near Denham Springs.

**General Purchasing Officer,** Panama Canal, Washington, asks bids until Nov. 3 for 38,000 ft. steel pipe (with alternate bid on wrought iron pipe) and for 1500 ft. steel pipe (Schedule 2913).

**Stonewall Gas Co.,** Ada, Okla., recently organized, plans natural gas welded steel pipe line from Fitts gas fields, Pontotoc County, to Ada and vicinity, about 14 miles.

**Taft, Cal.,** plans 40,658 ft. of 4 to 10-in. treated steel pipe for fire mains. Financing for $80,000 is being arranged.

**Independent Utilities Co.,** Jackson, Miss., plans welded steel pipe line to Ripley, Miss., where franchise for natural gas supply has been secured. Line will connect with trunk system near Jackson and will also serve other communities near Ripley.

# Demand for Finished Steel Lags in New York District

**Reduction in Rail Price May Release Large Tonnage from Railroads — New York Highway Section to Take 8000 Tons**

NEW YORK, Oct. 24.—Steel specifications have fallen off markedly since the filing of final releases against third quarter contracts. Most miscellaneous consumers are now fairly well stocked for some time to come and any fresh impetus to demand must come from the railroads or the building industry. Public works authorizations have reached a large total but to date few projects have yet reached the stage where steel contracts can be placed. Moreover, the approach of severe weather will undoubtedly cause the postponement of considerable highway work until next spring. The largest new construction project in this district is the extension of the West Side elevated highway from Thirty-eighth Street to Forty-sixth Street, New York, requiring 8000 tons, on which bids will be taken Nov. 3.

The announcement of a reduction of $2.25 in the price of rails to $37.75, f.o.b. mill, is regarded as fresh evidence of the lengths that steel producers will go to assist the Administration's effort for national recovery. It is common knowledge that the agitation for a reduction in the rail price at a time when the costs of the industry have increased $100,000,000 a year was regarded as unreasonable and contrary to the spirit of the recovery program. However, producers have apparently decided that a compromise is preferable to a long drawn out struggle for a principle. Even if the railroads promptly purchase the 844,000 tons of rails that they have indicated they require, it is not likely that there will be pressure for deliveries. The tonnage will probably be rolled at the mills' convenience throughout the winter, with shipments deferred, except for Southern lines, until next spring.

Tin plate bookings have declined, but mills have enough tonnage on hand to sustain the present rate of production through the rest of the year. Sheet demand is light. There is growing agitation for a revision of prices on sheet seconds. The present differential between primes and seconds is so small that buyers are disinclined to take the latter. Moreover, brokers accustomed to handling seconds in large lots are no longer given a discount which would make it possible for them to handle the material.

### Pig Iron

Despite pressure from sellers and danger of advanced quotations, melters are hesitant and tend to confine purchases to carlots covering immediate requirements. Shipments are considered satisfactory, and furnace representatives have fulfilled most old contracts. Current inquiry is uninteresting in volume and covers the routine needs of this district. Sales for the seven-day period suffered no serious decline from the average weekly sales and totaled 2600 tons, compared with 4000 tons in the previous week and 2700 tons a fortnight ago. Jobbing foundries are buying in reduced volume, but other foundries report sustained melting schedules.

### Reinforcing Steel

Road mesh awards are in reduced volume, and billet and rail steel reinforcing bars continue neglected. Contractors are encouraging price shading, but, despite current inactivity, distributers apparently intend to hold quotations firm at published levels. Their attitude, however, is receiving no test under pressure of attractive inquiry. Tonnages placed during the week include approximately 2800 tons of rail steel bars to Kalman Steel Corpn. for work in Buffalo. American Steel & Wire Co. will furnish 125 tons of mesh for highway repairs in Ontario County, N. Y. Considerable tonnage will be required in the spring if, on Oct. 25, the New York State Public Service Commission favorably considers the elimination of 15 railroad crossings at an approximate cost of $5,000,000.

### Scrap

The market undertone in this district is increasingly uncertain, with major grades weak and nominally established at lower levels. Easiness in outside markets, coupled with continued consumer disinterest, locally, has forced brokers' prices to $7.50 and $6.50, barge, for No. 1 and No. 2 heavy melting steel respectively. Specialties are enjoying sporadic demand, but other grades are practically ignored at lower levels. Unprepared yard iron and steel have leveled off at $3 a ton, barge, and No. 1 and No. 2 cast are uncertainly based 25c a ton lower at $7.25 and $6.25. Brokers continue unable to sell eastern Pennsylvania and Pittsburgh melters, and the direct loadings of the eastern Pennsylvania mill constitute practically all of current domestic trading. Foreign users generally withdrew tentative business as easiness developed here, but the recent dollar weakness in alien money markets is expected to result in additional Italian and Polish commitments. Japanese buyers are taking some specification pipe and occasional tonnages of heavy melting grades.

## Another Blast Furnace Banked in South

BIRMINGHAM, Oct. 24.—Another blast furnace has been banked, the second in two weeks, reducing the active total in this district to six. The furnace banked last week was Fairfield No. 6 of the Tennessee Coal, Iron & Railroad Co. The previous week Woodward Iron Co. banked its No. 3 stack, as already reported. Sloss-Sheffield Steel & Iron Co. and Republic Steel Corpn. continue with two each, while the Tennessee company and Woodward Iron now have one each. Five of these are on foundry iron and one on basic.

The market situation in pig iron is unchanged, with aggregate shipments about on a level with those of September and with only a small volume of new business, due to existing contracts. Quotations remain on a $13.50 base.

Two Birmingham pipe plants were low bidders on approximately 2700 tons of pipe at Los Angeles last week. Awards are expected this week. Other new tonnage has been scattered and in small lots.

### Steel

Steel demand is listless and in recent weeks there has been a decided sag in new tonnage. Present business is in small lots and irregular. Nine open-hearths out of 24 in the district were worked last week and the schedule for this week is the same. It is likely that next week will bring a further drop unless there is some unexpected business.

## Rail Prices Reduced

Prices of standard T-rails, over 60 lb. per yard, have been reduced $2.25 a gross ton to $37.75, f.o.b. the following mill points: Bessemer, Pa.; Steelton, Pa.; Sparrows Point, Md.; Lackawanna, N. Y.; Gary, Ind.; Indiana Harbor, Ind.; Ensley, Ala.; Minnequa, Colo. In addition, prices at coast ports have been filed with the American Iron and Steel Institute as follows: $38.75 a gross ton, New Orleans, La., and Mobile, Ala.; $39.50 Houston, Galveston and Port Arthur, Tex.; and $41.75 Pacific Coast ports. The new prices are effective Oct. 30.

## Steel Output at 31.8 Per Cent Rate

TELEGRAPHIC reports received from companies having 98.1 per cent of the steel capacity of the industry indicate that they are for the week beginning Monday, Oct. 23, operating at 31.8 per cent of their capacity.

This is the first of a series of weekly reports which the American Iron and Steel Institute will collect under the code for the industry. It is the intention of the institute to issue this report on Monday of each week and thereby make available a more authoritative figure than has been available to the trade in the past.

## Pig Iron Dull, Scrap Weak at Cincinnati

CINCINNATI, Oct. 24.—Pig iron bookings are light, totaling about 350 tons for the week. Further lack of consumer interest is reflected in the absence of inquiry. Quotations on both Northern and Southern iron are steady, although furnace representatives are watching other districts for changes due to increased fuel and labor costs. Shipments have declined, as melters have sought a breathing spell from steadily mounting inventories. Foundry operations are spotty. The strike among tool and die workers in Detroit has stimulated business in a few isolated instances in this district.

### Coke

Forward buying of foundry grades of coke is nil. Shipments on old contracts are fair, but the low melt is still retarding demand for fuel.

### Warehouse Business

Tonnage business from industrial sources has been consistently good this month. While the total number of orders has declined, there has been an offsetting increase in tonnage booked. Prices in this area have been increased as the result of adding freight rates and warehouse differentials to the Pittsburgh base quotations.

### Steel

Sheet demand in this district is steady at about 45 per cent of mill capacity, with rolling schedules on a parity with new business. Automotive specifications are better than mill operators expected following reports of Detroit labor difficulties. The leading interest in this district reports that all of its units are in operation each week, but the schedules are less than 50 per cent of normal. Prices have ceased to be sources of trouble, since consumers display a willingness to accept quotations without serious question.

### Scrap

Scrap dealers have reduced bids 25 to 50c. on important items as a result of apathy on the part of the mills. Those dealers who still have unfilled contracts are moving some scrap, but new business is absent. Material continues to be available in good quantity.

## Scrap Falls Further at Detroit

DETROIT, Oct. 24.—Scrap prices declined 25c. to 50c. a ton the past week, and heavy melting steel and hydraulic compressed sheets now are selling at $7 to $7.50. The local steel plant, which is continuing to operate all six of its open-hearth furnaces, is taking in scrap on recently closed contracts, but movement of materials to other steel-making districts is practically at a standstill. Ford is again offering some open-hearth scrap on the open market despite the fact that it is reported to be warming up four open-hearth furnaces at Dearborn.

## Sheet Steel Piling Advanced

Prices have been filed with the American Iron and Steel Institute, effective Nov. 1, raising quotations on sheet steel piling $2 a ton. The new prices are 2c. a lb., Pittsburgh; 2.10c., Buffalo; 2.10c., Chicago; 2.45c., Gulf ports; 2.45c., Pacific ports.

## Cast Iron Pipe

**River Rouge, Mich.,** plans 7500 ft. of 12 to 20-in. for main trunk line water supply. Fund of $380,000 is being arranged for complete waterworks, including pumping plant, filtration plant, etc. Mason L. Brown & Son, 120 Madison Avenue, Detroit, is consulting engineers.

**Somerset, Ohio,** plans pipe line system for water service. Fund of $110,000 is being arranged. Jennings & Lawrence, 13 North Third Street, Columbus, Ohio, are engineers.

**International Falls, Minn.,** plans 4½ miles 20-in., for new water supply system. Bonds for $230,000 are being arranged, including pumping station, water tower and other equipment. Toltz, King & Day, Inc., Pioneer Building, St. Paul, Minn., are consulting engineers.

**Tompkinsville, Ky.,** plans water pipe line system. Fund of $50,000 is being arranged. J. S. Watkins, Lexington, Ky., is engineer.

**Cabot, Ark.,** plans water pipe line system. Financing for $40,000 is planned. Frank Pritchett, Wallace Building, Little Rock, Ark., is consulting engineer.

**Hawthorne, Cal.,** plans 4 to 8-in., and about 72,000 ft. of 2-in. for new water supply system. Bond issue of $135,000 is being arranged. W. R. Barclay, city engineer.

**Los Angeles** has taken bids on 2750 tons of 6 to 24-in.

**Long Beach, Cal.,** will take bids for 1600 tons of 20 and 24-in. on Oct. 31.

**Fort Lewis, Wash.,** has taken bids on 7000 ft. of 6 and 8-in.

## Pennsylvania Opens Bids For Highway Projects

ON Oct. 19, bids were opened at Harrisburg covering highway projects estimated to cost approximately $520,000. The construction includes reinforced concrete pavements and miscellaneous structures in Venango, Luzerne, Fayette, Northumberland and Erie counties.

Additional proposals were opened on Oct. 20 covering highway repairs and improvements in Clinton, Wayne, Schuylkill, Montgomery and Somerset counties. This work was bid in at an aggregate cost approximating $415,000.

## Foundry Equipment Orders Decline

THE Foundry Equipment Manufacturers Association reports that the index of net orders for September was 34.9, as compared with 56.28 in August. The report covers the activity of 17 companies. The index for September, 1932, was 11.9 for 15 reporting companies. The September shipments index was 41.5, against 49.7 in August, and 10.2 in September, 1932. Index of unfilled orders, as of Sept. 30, was 32, whereas for August it was 35.3, and 17.6 for September, 1932.

## September G. M. Sales Double Last Year

SEPTEMBER sales of General Motors cars to consumers in the United States totaled 71,458, as against 86,372 in August, and 34,694 in September a year ago.

September sales of General Motors cars to dealers in the United States totaled 67,733, as against 84,504 in August, and 23,545 in September a year ago.

September sales of General Motors cars to dealers in the United States and Canada, together with shipments overseas, totaled 81,148, as against 97,614 in August, and 30,117 in September a year ago.

## Industrial Locomotive Shipments, 3rd Quarter

WASHINGTON, Oct. 24.—Shipments of mining and industrial electric locomotives during the third quarter of the current year totaled 38 units, valued at $156,280, compared with 26, valued at $81,315 in the preceding quarter and 12 units, valued at $50,133 in the corresponding quarter of last year, according to reports to the Bureau of the Census by 10 manufacturers.

# Allotments for Aircraft, Motorization and Public Works

WASHINGTON, Oct. 24.—An allotment of $15,000,000 for airplane construction for the Army and Navy and $10,000,000 for motorization of the Army has been made by the Public Works Administration. The Army had asked for greater sum for motorization and is expected to renew efforts for a larger allotment. The $15,000,000 for airplane construction also was unsatisfactory to both the Army and Navy. The division of the total will be decided upon at a joint meeting of a joint board of the War and Navy Departments. Naval officials say that with construction of more than 40 ships under way or ordered, the Navy will need about 400 airplanes, estimated to cost $15,000,000.

Among other allotments made by the Public Works Administration are the following:

Douglas County, Wis., $437,500, loan and grant, for approximately 43 miles of grading and bituminous surfacing and approximately 94 miles of grading and gravel surfacing and 15 small bridge projects. Work can begin in 30 days.

Fond du Lac, Wis., $434,000, loan and grant, for construction of industrial waste disposal plant, replacement of old water mains, construction of four highway bridges, addition to school, fire department station and city hall. Construction of city hall dependent on favorable referendum vote. Work can start in six weeks.

Aberdeen, S. D., $789,000, loan and grant, for construction of storage reservoir, diversion dam and water treatment, filter and pump plant, pressure pipe line and elevated steel water tank. Work can start in one month.

Northampton, Mass., $242,000, loan and grant, to State of Massachusetts, for construction and furnishing one war building at hospital for insane. Work can start at once.

Seattle, Wash., $111,160, loan and grant, for construction of single span reinforced concrete arch bridge. Work can start in one month.

Carlisle, Pa., $220,000, for reconstruction and enlargement of existing sewage disposal plant. Work can start in one month.

Pocatello, Idaho, $187,000, loan and grant, for construction of 11,000,000-gal. distributing reservoir. Work can start in six weeks.

Ann Arbor, Mich., $650,000, loan and grant, for construction of trunk line sewer and sewage disposal plant. Work can start at once.

Framingham, Mass., $218,520, loan and grant, for construction of State police headquarters barracks and substation barracks. Work can start in one month.

Amherst, Mass., $121,000, loan and grant, to State of Massachusetts, for construction of 3400-ft. concrete terminal, installation of steam supply mains and returns and installation of 625-KVA unit steam turbine generators at State College. Work can start in one month.

## Nine Minute Hearing For Rolling Door Code

WASHINGTON, Oct. 24.—For brevity, the hearing on the code for the rolling door industry has set a record. It was concluded after nine minutes. Three of the minutes were used up by Assistant Deputy Administrator William Lawson to call the audience of four persons to order. Four more minutes went for filing of the code by H. A. Toulmin, representing the Rolling Door Institute and for presentation of a brief by William P. McGinn, president, International Association of Bridge, Structural and Ornamental Iron Workers. Deputy Lawson then took the two remaining minutes to explain steps to be taken in preparing the code for final approval by President Roosevelt. This ended the code hearing for this highly specialized industry.

The code provides a 40-hr. work week for plant employees. Those on an hourly wage rate may work 48 hr. for a period not to exceed six weeks in any half year. The minimum wage for factory workers is 40c. per hour.

## Bolt and Nut and Special Tool Hearings

WASHINGTON, Oct. 24.—Hearing on the code of fair competition filed by the Associated Machine Tool Dealers, claiming to represent 55 per cent of the industry, will take place on Friday of the present week at the Shoreham Hotel before Deputy Administrator Malcolm Muir. It provides for a 40-hr. week for plant workers with permission to work 48 hr. for three weeks in any six months' period. A 48-hr. week is proposed for outside delivery men and maintenance employees. The minimum wage proposed is $15 a week for all employees except learners, who would receive not less than $13 during a six months' apprenticeship.

The Special Tool, Die and Machine Shop Institute, claiming to represent 80 per cent of the industry, will present its code at a hearing on Nov. 2 before Deputy Muir. The code provides a 48-hr. week for tool, die and special machine designers and engineers, and tool makers, die makers, pressure mold makers and special machinery builders and a 40-hr. week for other employees. Learners, apprentices, superannuated or disabled employees would receive a minimum of 25c per hour to start; direct labor in the manufacture of tools, special dies, jigs, special fixtures, special gaging fixtures, pressure molds, engineering and development would be paid not less than 70c an hr. Other employees would be paid 40c an hr. as a minimum.

Deputy Administrator H. O. King will preside at a hearing on the bolt, nut and rivet industry on Oct. 31. The code was filed by the American Institute of Bolt, Nut and Rivet Manufacturers, claiming to represent 77 per cent of the industry. It provides for a 40-hr. week, and minimum wages vary, according to geographical districts, from 25c to 40c an hr. for male workers and from 25c to 32c for female help.

## OBITUARY

JOHN G. BANNISTER, who retired about six years ago as vice-president in charge of engineering of the Walworth Co., died at his home in Phoenix, Ariz., on Oct. 15. He was 73 years old.

❖ ❖ ❖

MORRIS R. JOHNSON, assistant superintendent of the Ensley rail mill of the Tennessee Coal, Iron & Railroad Co., died on Oct. 16.

❖ ❖ ❖

KING L. PARKER, formerly vice-president of the Emerson Electric Co., St. Louis, died in that city on Oct. 19. He had been in poor health for some time.

❖ ❖ ❖

OLE J. LUNDE, pioneer manufacturer of brass, bronze and aluminum castings at LaCrosse, Wis., died Oct. 14, aged 68 years. He was born in Lillehammer, Norway, July 4, 1865, and settled in LaCrosse in 1887, establishing his foundry in 1889.

Harbison-Walker Refractories Co. and subsidiaries reported profit for quarter ended Sept. 30 of $500,600, compared with $247,700 in the preceding quarter. In the first nine months net profits totaled $542,100 after charges and dividend requirements on preferred stock. Net loss in the first nine months of last year was $277,100.

Westinghouse Electric & Mfg. Co., in the quarter ended Sept. 30, sustained a net loss of $1,514,645, compared with a net loss of $2,078,424 in the second quarter, and a net loss of $2,715,125 in the third quarter last year.

# Fabricated Structural Steel

## Awards Gain—New Projects in Good Volume

STRUCTURAL steel bookings of 13,100 tons compare with 10,200 tons last week and 19,300 tons two weeks ago. Of the week's total 10,600 tons is accounted for by public works projects, the largest of which is a machine shop at the Puget Sound Navy Yard, requiring 3600 tons. A dam at Gallipolis, Ohio, will take 2200 tons. New projects of 27,500 tons include 10,400 tons for a hospital at New Orleans and 8000 tons for a section of the West Side highway in New York, between Thirty-eighth and Forty-sixth Streets. Bids on the latter job will be taken Nov. 3. Structural steel lettings for the week follow:

### NORTH ATLANTIC STATES

**East Boston-Revere, Mass.,** 880 tons, four State bridges, to Boston Bridge Works, Inc.

**Farmington, Conn.,** 130 tons, State highway bridge, to American Bridge Co.; Mariani Construction Co., New York, general contractor.

**Delaware & Hudson Railroad,** 115 tons, bridge at Elnora, N. Y., to McClintic-Marshall Corpn.

**Steuben County, N. Y.,** 225 tons, State highway bridge, to McCintic-Marshall Corpn.

### SOUTH AND SOUTHWEST

**Huntington, W. Va.,** 1200 tons, Kanawha River lock gates, to Dravo Contracting Co.

**Enka, N. C.,** 440 tons, American Enka Corpn. building, to Carolina Steel Co.

**State of Arizono,** 135 tons, bridge spans, to Allison Steel Co.

**State of New Mexico,** 175 tons, bridge, to American Bridge Co.

### CENTRAL STATES

**Cleveland,** 130 tons, foot bridge, to McClintic-Marshall Corpn.

**Gallipolis, Ohio,** 2200 tons, dam, to Dravo Contracting Co.

**State of Minnesota,** 125 tons, bridge, to Illinois Steel Bridge Co., Jacksonville, Ill.

**Springfield, Ill.,** 700 tons, power house, to Duffin Iron Works.

**Glade, Kan.,** 400 tons, bridge, to Kansas City Structural Steel Co.

**Buchanan County, Mo.,** 400 tons, bridges, to St. Louis Structural Steel Co.

### WESTERN STATES

**State of Idaho,** 120 tons, Moyle River bridges, to Virginia Bridge & Iron Co., Inc.

**Ranchester, Wyo.,** 150 tons, bridge, to Pittsburgh-Des Moines Steel Co.

**San Francisco,** 300 tons, General Brewery building, to Western Iron Works.

**San Diego,** 942 tons, assembly shop at Navy Yard, to McClintic-Marshall Corpn.

**San Bernardino County, Cal.,** 600 tons, State overhead crossing, to Consolidated Steel Co.

**Los Angeles,** 112 tons, warehouse for Chrysler Corpn., to Consolidated Steel Corpn.

**Bremerton, Wash.,** 3600 tons, machine shop at Navy Yard, to McClintic-Marshall Corpn.

### NEW STRUCTURAL STEEL PROJECTS

### NORTH ATLANTIC STATES

**Arlington-Cambridge-Belmont, Mass.,** 260 tons, State bridges.

**New York,** 8000 tons, section of West Side elevated highway, Thirty-eighth Street to Forty-sixth Street; bids to be taken Nov. 3.

**Hornell, N. Y.,** 125 tons, State highway bridge.

**Avoca, N. Y.,** 150 tons, State highway bridge.

**Flushing, N. Y.,** 195 tons, State highway bridge.

**Montrose, N. Y.,** 180 tons, building for State Department of Public Works.

**Wildwood, N. J.,** 140 tons, State project; bids in.

### SOUTH AND SOUTHWEST

**Owensboro, Ky.,** 720 tons, horses and props for Dams 46, 49 and 50; bids to be taken by United States Engineer Office.

**State of Oklahoma,** 500 tons, bridges.

**Gonzales, Tex.,** 350 tons, bridge.

**New Orleans,** 10,400 tons, hospital.

**Norclo, La.,** 3800 tons, bridge for Louisiana & Arkansas Railroad.

### CENTRAL STATES

**Cleveland,** 100 tons, sludge digesting tanks for Easterly sewage disposal plant; bids to be taken Nov. 2.

**Michigan City, Ind.,** 350 tons, Zorn Brewing Co.

**Onalaska, Wis.,** 600 tons structural, also 400 tons of steel casting, Mississippi River Lock No. 7; bids close Nov. 3.

**State of Wisconsin,** 150 tons, Yellow River bridge; John O. Fischer, Wausau, Wis., low bidder on general contract.

**Port Washington, Wis.,** 1000 tons steel piling, Government breakwater; bids close Nov. 1.

**Dreshach, Minn.,** 1100 tons, Lock No. 7.

### WESTERN STATES

**Spokane, Wash.,** 200 tons, Felts Field hangar; bids under advisement.

**State of Montana,** 182 tons, bridge over Tongue River; bids Oct. 28.

**Granite County, Mont.,** 100 tons, State bridge over Hellgate River; bids Oct. 28.

### FABRICATED PLATE

### AWARDS

**San Diego,** 275 tons, oil tanks at Navy Yard, to Chicago Bridge & Iron Works.

### NEW PROJECTS

**Memphis, Tenn.,** 900 tons, 48 pontoons for United States Engineer Office; bids to be opened Oct. 31.

**Washington,** 225 tons, lighthouse tender Hollyhock, Moore Dry Docks Co., low bidder.

**Cleveland,** 1140 tons, sludge digesting tanks for Easterly sewage disposal plant; bids to be taken Nov. 2.

# Preparing Plans For Chinese Steel Plant

PLANS for a steel plant in Kwangtung Province, China, are being prepared by Arthur G. McKee & Co., engineers, Cleveland. A Chinese engineer representing the Mining Division of the Kwangtung department of construction is now in Cleveland cooperating with William A. Haven, vice-president of the McKee company, in designing the plant. The proposed construction will include one blast furnace with a daily capacity of 250 to 450 tons, provision being made for the erection of additional stacks, one battery of coke ovens, a combined blooming, rail and structural mill and a small hand mill for rolling merchant bars and small shapes. One of the products will be reinforcing bars for which considerable demand is said to have developed in China for use in highway construction work.

Although the McKee contract is limited to designing the plant, this firm may be commissioned to purchase the equipment, which probably will be bought from the country making the most favorable bids. A large amount of iron ore is available in the Kwangtung Province, which is regarded as one of the most progressive districts in China.

# Used Machinery Dealers Organize

DELEGATES representing about 300 used machinery and equipment firms met Oct. 21 and 22 at the Hotel La Salle, Chicago, and organized the National Association of Used Machinery and Equipment Dealers.

This was the third attempt at a national organization, previous efforts having been made at New York and at Cleveland. Delegates were present from New York, Philadelphia, Detroit, Cleveland, Pittsburgh, St. Louis, Harrisburg, Saginaw, Albany, Chicago and other centers. It was estimated that the association will eventually embrace over 500 members. The officers are: President, M. D. Galbreath, Marr-Galbreath Machinery Co., Pittsburgh; vice-president, S. A. Dewitt, Dewitt Tool Co., New York, and treasurer, C. L. McDonald, McDonald Machinery Co., St. Louis.

At a later date a board of governors will be elected and that body will select a secretary. Active organization of local chapters is to be undertaken at once.

# Employment and Payrolls Higher

EMPLOYMENT in manufacturing industries during September increased 3.2 per cent over August, and pay rolls increased 2.7 per cent in the interval, according to the index of the United States Bureau of Labor Statistics. The index of employment in September stood at 73.9, compared with 71.6 in August, and the September index of pay rolls was 53.3, compared with 51.9 in the preceding month.

The level of employment in September was 26.3 per cent above the level of September, 1932, and pay rolls in September, 1933, showed a gain of 39.9 per cent over the 1932 month.

# Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

## BARS, PLATES, SHAPES

### Iron and Steel Bars

*Soft Steel*

*Base per Lb.*

F.o.b. Pittsburgh mill .....1.75c.
F.o.b. Chicago or Gary.....1.80c.
Del'd Philadelphia .....2.04c.
Del'd New York.....2.08c.
F.o.b. Cleveland .....1.80c.
F.o.b. Buffalo .....1.85c.
F.o.b. Birmingham .....1.90c.
F.o.b. cars dock Pacific ports .....2.30c.
F.o.b. cars dock Gulf ports.....2.15c.

*Rail Steel*

(For merchant trade)

F.o.b. Cleveland .....1.70c.
F.o.b. Chicago .....1.70c.
F.o.b. Gary .....1.70c.
F.o.b. Pittsburgh .....1.65c.
F.o.b. Buffalo .....1.75c.
F.o.b. Birmingham .....1.80c.

*Billet Steel Reinforcing*

(Stock lengths as quoted by distributers; cutting to length, 60 in. and over takes extra of 10c. per 100 lb.)

F.o.b. P'gh mills .....1.80c.
F.o.b. Birmingham .....1.85c.
F.o.b. Buffalo .....1.85c.
F.o.b. Cleveland .....1.85c.
F.o.b. Youngstown .....1.85c.
F.o.b. Chicago or Gary .....1.85c.
F.o.b. cars dock Pacific ports.....2.35c.
F.o.b. cars dock Gulf ports.....2.20c.

*Rail Steel Reinforcing*

(Cut lengths as quoted by distributers)

F.o.b. Pittsburgh .....1.75c.
F.o.b. Cleveland .....1.80c.
F.o.b. Chicago .....1.80c.

*Iron*

Common iron, f.o.b. Chicago.....1.60c.
Refined iron, f.o.b. P'gh mills.....2.75c.
Common iron, del'd Philadelphia .....1.74c.
Common iron del'd New York.....1.90c.

### Steel Car Axles

F.o.b. Pittsburgh .....2.50c.
F.o.b. Chicago .....2.50c.

### Tank Plates

*Base per Lb.*

F.o.b. Pittsburgh mill.....1.70c.
F.o.b. Chicago .....1.75c.
F.o.b. Gary .....1.75c.
F.o.b. Birmingham .....1.85c.
Del'd Cleveland .....1.885c.
Del'd Philadelphia .....1.885c.
F.o.b. Coatesville .....1.80c.
F.o.b. Sparrows Point.....1.80c.
Del'd New York .....1.98c.
F.o.b. dock cars Pacific ports .....2.25c.
F.o.b. cars dock, Gulf ports.....2.10c.
Wrought iron plates, f.o.b. P'gh....3.00c.

### Floor Plates

F.o.b. Pittsburgh .....3.20c.
F.o.b. Chicago .....3.25c.

### Structural Shapes

*Base per Lb.*

F.o.b. Pittsburgh mill.....1.70c.
F.o.b. Chicago .....1.75c.
F.o.b. Birmingham .....1.85c.
F.o.b. Buffalo .....1.80c.
F.o.b. Bethlehem .....1.80c.
Del'd Cleveland .....1.885c.
Del'd Philadelphia .....1.905c.
Del'd New York .....1.9525c.
F.o.b. cars dock, Gulf ports.....2.10c.
F.o.b. dock cars Pacific ports (standard) .....2.25c.
F.o.b. dock cars Pacific ports (wide flange) .....2.35c.

### Steel Sheet Piling

*Base per Lb.*

F.o.b. Pittsburgh .....1.90c.
F.o.b. Chicago mill .....2.00c.
F.o.b. Buffalo .....2.00c.

### Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base..2.45c. a lb. except at Bethlehem where the price is 2.55c.

S.A.E. Series Numbers | Alloy Differential per 100 Lb.

2000 (½ % Nickel) ..... $0.25
2100 (2½ % Nickel) ..... 0.55
2300 (3½ % Nickel) ..... 1.50
2500 (5% Nickel) ..... 2.25
3100 Nickel Chromium ..... 0.55
3200 Nickel Chromium ..... 1.35
3300 Nickel Chromium ..... 3.80
3400 Nickel Chromium ..... 3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum) ..... 0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum) ..... 0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum). (1.50 to 2.00 Nickel ..... 1.05
5100 Chromium Steel (0.60 to 0.90 Chromium) ..... 0.35
5100 Chromium Steel (0.80 to 1.10 Chromium) ..... 0.45
5100 Chromium Spring Steel .... base
6100 Chromium Vanadium Bar ... 1.20
4100 Chromium Vanadium Spring Steel ..... 0.95
Chromium Nickel Vanadium .... 1.50
Carbon Vanadium ..... 0.95

Above prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

### Cold Finished Bars*

Bars, f.o.b. Pittsburgh mill .....1.95c.
Bars, f.o.b. Chicago .....2c.
Bars, Cleveland .....2c.
Bars, Buffalo .....2c.
Bars, Detroit .....2.15c.
Bars, eastern Michigan .....2.20c.
Shafting, ground, f.o.b. mill,
1¼ in. 3.25c.
1-3/16 to 1½ in. 2.75c.
1-9/16 to 1⅞ in. 2.60c.
1-15/16 to 2⅞ in. 2.45c.
2-15/16 to 6 in. 2.30c.

* In quantities of 10,000 to 19,999 lb.

## SHEETS, STRIP, TIN PLATE TERNE PLATE

### Sheets

*Hot Rolled*

No. 10, f.o.b. Pittsburgh .....1.75c
No. 10, f.o.b. Gary .....1.85c.
No. 10, del'd Phila. .....2.04c.
No. 10, f.o.b. Birmingham .....1.90c.
No. 10, f.o.b. dock cars Pacific ports .....2.42½c.

*Hot-Rolled Annealed*

No. 24, f.o.b. Pittsburgh .....2.25c.
No. 24, f.o.b. Gary .....2.35c.
No. 24, del'd Phila. .....2.54c.
No. 24, f.o.b. Birmingham .....2.40c.
No. 24, f.o.b. dock cars Pacific ports .....2.95c.
No. 24, wrought iron, Pittsburgh...4.30c.

*Heavy Cold-Rolled*

No. 10 gage, f.o.b. Pittsburgh.....2.30c.
No. 10 gage, f.o.b. Gary .....2.40c.
No. 10 gage, del'd Phila. .....2.59c.
No. 10 gage, f.o.b. dock cars Pacific ports .....3.00c.

*Light Cold-Rolled*

No. 20 gage, f.o.b. Pittsburgh ....2.75c.
No. 20 gage, f.o.b. Gary .....2.85c.
No. 20 gage, del'd Phila. .....3.04c.
No. 20 gage, f.o.b. dock cars Pacific ports .....4.45c.

*Galvanized Sheets*

No. 24, f.o.b. Pittsburgh .....2.85c.
No. 24, f.o.b. Gary .....2.95c.
No. 24, del'd Phila. .....3.14c.
No. 24, f.o.b. Birmingham .....3.00c.
No. 24, f.o.b. dock cars Pacific ports .....3.55c.
No. 24, wrought iron, Pittsburgh ..4.95c.

*Long Terne*

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh .....2.90c.

*Vitreous Enameling Stock*

No. 20, f.o.b. Pittsburgh .....2.90c.

*Tin Mill Black Plate*

No. 28, f.o.b. Pittsburgh .....2.50c.
No. 28, Gary .....2.60c.

### Tin Plate

*Base per Box*

Standard cokes, f.o.b. P'gh district mill .....$4.65
Standard cokes, f.o.b. Gary ..... 4.75

### Terne Plate

*(F.o.b. Pittsburgh)*

(Per Package, 20 x 28 in.)

8-lb. coating I.C. ..... $8.70
15-lb. coating I.C. ..... 11.00
20-lb. coating I.C. ..... 11.90
25-lb. coating I.C. ..... 13.00
30-lb. coating I.C. ..... 13.80
40-lb. coating I.C. ..... 15.30

### Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

*Base per Lb.*

All widths up to 24 in., P'gh. .....1.75c.
All widths up to 24 in., Chicago .. ..1.85c.
Cooperage stock, Pittsburgh .....1.85c.
Cooperage stock, Chicago .....1.95c.

### Cold-Rolled Strips

F.o.b. Pittsburgh .....2.40c.
F.o.b. Cleveland .....2.40c.
Del'd Chicago .....2.68c.
F.o.b. Worcester .....2.60c.

*Fender Stock*

No. 20, Pittsburgh or Cleveland ....3.10c.

## WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

*To Manufacturing Trade*

*Per Lb.*

Bright wire .....2.10c.
Spring wire .....3.10c.

*To Jobbing Trade*

Extras of 10c. a 100 lb. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. An allowance of $2 a ton is made to jobbers on straight, mixed or joint carloads; $3 a ton is allowed on less-than-carload shipments.

*Base per Keg*

Standard wire nails .....$2.10
Smooth coated nails ..... 2.10
Galvanized nails ..... 3.60

*Base per 100 Lb.*

Smooth annealed wire ..... $2.25
Smooth galvanized wire ..... 2.60
Polished staples ..... 2.80
Galvanized staples ..... 3.05
Barbed wire, galvanized ..... 2.60
Woven wire fence, base column .. 55.00

*Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.*

## STEEL AND WROUGHT PIPE AND TUBING

### Welded Pipe

**Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills**

*Butt Weld*

| Steel | | | Wrought Iron | | |
|---|---|---|---|---|---|
| Inches | Black | Galv. | Inches | Black | Galv. |
| ⅛ ..... | 51½ | 29½ | ¼ ..... | +91½ | +138 |
| ¼ to ⅜.. | 57 | 38½ | ⅜ & ½ | +11½ | +21½ |
| ½ ..... | 62 | 50½ | ½ ..... | 31½ | 15 |
| ¾ ..... | 65½ | 55½ | ¾ ..... | 36½ | 20½ |
| 1 to 3 ... | 67½ | 58½ | 1 & 1¼.. | 39½ | 25½ |
| | | | 1½ ... | 43½ | 28 |
| | | | 2 ..... | 41½ | 26 |

*Lap Weld*

| | | | | | |
|---|---|---|---|---|---|
| 2 ..... | 63½ | 54½ | 2 ..... | 37 | 22½ |
| 2½ to 3.. | 66½ | 57½ | 2½ to 3½ | 38 | 25 |
| 3½ to 6.. | 68½ | 59½ | 4 to 8.. | 40 | 28½ |
| 7 and 8 .. | 67½ | 57½ | 9 to 12.. | 38 | 24½ |
| 9 and 10.. | 67 | 57 | | | |
| 11 and 12 | 66 | 56 | | | |

*Butt Weld, extra strong, plain ends*

| | | | | | |
|---|---|---|---|---|---|
| ⅛ ..... | 48½ | 33½ | ⅛ ..... | +13 | +45½ |
| ¼ to ⅜.. | 54½ | 41½ | ¼ & ⅜ | +2½ | +34½ |
| ½ ..... | 60 | 51 | ½ ..... | 32½ | 17½ |
| ¾ ..... | 64½ | 55½ | ¾ ..... | 37½ | 22½ |
| 1 to 3... | 66½ | 58½ | 1 to 2.. | 43½ | 29 |

*Lap Weld, extra strong, plain ends*

| | | | | | |
|---|---|---|---|---|---|
| 2 ..... | 61½ | 53½ | 2 ..... | 40 | 26 |
| 2½ to 3.. | 65½ | 57½ | 2½ to 4 | 45½ | 33 |
| 3½ to 6.. | 69 | 61 | 4½ to 6 | 45 | 32½ |
| 7 and 8 .. | 68 | 58 | 7 & 8.. | 46 | 33 |
| 9 and 10.. | 67 | 57 | 9 to 12. | 41½ | 30 |
| 11 and 12. | 66 | 56 | | | |

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2¼ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

### Boiler Tubes

**Base Discounts, f.o.b. Pittsburgh**

| Steel | | Charcoal Iron | |
|---|---|---|---|
| 2 in. and 2¼ in. ..... | 33 | 1½ in. ..... | 1 |
| 2½ in.—2¾ in. | 40 | 1¾ in. ..... | 8 |
| 3 in. ..... | 47 | 2 in.—2¼ in.. | 13 |
| 3¼ in.—4¾ in. | 50 | 2½ in.—2¾ in. | 16 |
| 4 in. ..... | 52 | 3 in. ..... | 17 |
| 4½ in. to 6 in. | 42 | 3¼ in. to 3½ in ..... | 18 |
| | | 4 in. ..... | 20 |
| | | 4½ in. ..... | 21 |

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

*Standard Commercial Seamless Boiler Tubes*

*Cold-Drawn*

| | | | |
|---|---|---|---|
| 1 in. ..... | 61 | 3 in. ..... | 41 |
| 1¼ to 1½ in... | 53 | 3¼ to 3½ in... | 44 |
| 1¾ in. ..... | 37 | 4 in. ..... | 46 |
| 2 to 2¼ in.... | 27 | 4½, 5 and 6 in | 36 |
| 2½ to 2¾ in... | 34 | | |

*Hot-Rolled*

| | | | |
|---|---|---|---|
| 2 and 2¼ in... | 33 | 3¼ to 3½ in... | 50 |
| 2½ and 2¾ in. | 40 | 4 in. ..... | 52 |
| 3 in. ..... | 47 | 4½, 5 and 6 in. | 42 |

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

### Seamless Mechanical Tubing

*Per Cent Off List*

Carbon, 0.10% to 0.30% base (carloads) 55
Carbon, 0.30% to 40% base ..... 50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

## RAILS AND TRACK SUPPLIES

### F.o.b. Mill

Standard rails, 60-lb. and heavier, per gross ton .....$40.00
Angle bars, per 100 lb. ..... 2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton .....$32.00
Light rails (from rail steel) per gross ton ..... 31.00

*Base per 100 Lb.*

Spikes, 9/16 in. and larger ..... $2.40
Spikes, ½ in. and smaller ..... 2.40
Spikes, boat and barge ..... 2.40
Tie plates, steel ..... 1.90
Track bolts, to steam railroads .... 3.40
Track bolts, to jobbers, all sizes (per 100 count).....70 per cent off list

## BOLTS, NUTS, RIVETS AND SET SCREWS

### Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

*Per Cent Off List*

Machine bolts ..... 70
Carriage bolts ..... 70
Lag bolts ..... 70
Plow bolts, Nos. 1, 2, 3 and 7 heads.. 70
Hot-pressed nuts, blank or tapped, square ..... 70
Hot-pressed nuts, blank or tapped, hexagons ..... 70
C.p.c. and t. square or hex nuts, blank or tapped ..... 70
Semi-finished hexagon nuts ..... 70
Semi-finished hexagon castellated nuts, S.A.E. ..... 70
Stove bolts in packages, P'gh. 72½, 25 and 10
Stove bolts in packages, Ch'go. 72½, 25 and 10
Stove bolts in packages, Cleveland. 72½, 25 and 10
Stove bolts in bulk, P'gh. ..... 85
Stove bolts in bulk, Chicago ..... 85
Stove bolts in bulk, Cleveland ..... 85
Tire bolts ..... 60

### Large Rivets

(½-in. and larger)

*Base per 100 Lb.*

F.o.b. Pittsburgh or Cleveland..... $2.75
F.o.b. Chicago and Birmingham.... 2.85

### Small Rivets

(7/16-in. and smaller)

*Per Cent Off List*

F.o.b. Pittsburgh .....70 and 10
F.o.b. Cleveland .....70 and 10
F.o.b. Chicago and Birm'g'm....70 and 10

### Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

*Per Cent Off List*

Milled cap screw, 1 in. dia. and smaller ..... 30
Milled standard set screws, case hardened, 1 in. dia. and smaller ..... 60
Milled headless set screws, cut thread ¾ in. and smaller .....75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller .....85 and 10
Upset set screws, sq. head ..... 60
Milled studs ..... 70

## SEMI-FINISHED STEEL

### Billets, Blooms and Slabs

F.o.b. Pittsburgh, Youngstown, Chicago, Gary, Buffalo, Cleveland, Birmingham.

*Per Gross Ton*

Rerolling .....$26.00
Forging quality ..... 31.00

### Sheet Bars

F.o.b. Pittsburgh, Youngstown, Cleveland, Chicago, Buffalo, Canton, Sparrows Point.

*Per Gross Ton*

Open-hearth or Bessemer .....$26.00

### Skelp

F.o.b. Pittsburgh, Youngstown, Chicago, Buffalo, Coatesville, Pa., or Sparrows Point, Md.

*Per Lb.*

Grooved .....1.60c.
Universal .....1.60c.
Sheared .....1.60c.

# Pig Iron, Ores, Ferroalloys

## PIG IRON

### PRICES PER GROSS TON AT BASING POINTS

| Basing Points | No. 2 Fdry. | Malleable | Basic | Bessemer |
|---|---|---|---|---|
| Everett, Mass. | $18.00 | $18.50 | $17.50 | $19.00 |
| Bethlehem, Pa. | 17.50 | 18.00 | 17.00 | 18.50 |
| Birdsboro, Pa. | 17.50 | 18.00 | 17.00 | 18.50 |
| Swedeland, Pa. | 17.50 | 18.00 | 17.00 | 18.50 |
| Sparrows Point, Md. | 17.50 | 18.00 | 17.00 | 18.50 |
| Neville Island, Pa. | 18.00 | 18.00 | 17.50 | 18.50 |
| Sharpsville, Pa. | 17.50 | 17.50 | 17.00 | 18.00 |
| Youngstown | 17.50 | 17.50 | 17.00 | 18.00 |
| Buffalo | 17.50 | 18.00 | 16.50 | 18.50 |
| Erie, Pa. | 17.50 | 18.00 | 17.00 | 18.50 |
| Cleveland | 17.50 | 17.50 | 17.00 | 18.00 |
| Toledo, Ohio | 17.50 | 17.50 | 17.00 | 18.00 |
| Detroit | 17.50 | 17.50 | 17.00 | 18.00 |
| Hamilton, Ohio | 17.50 | 17.50 | 17.00 | 18.00 |
| Chicago | 17.50 | 17.50 | 17.00 | 18.00 |
| Granite City, Ill. | 17.50 | 18.00 | 17.00 | .... |
| Duluth, Minn. | 18.00 | 18.00 | .... | 18.50 |
| Birmingham | 13.50 | .... | 12.50 | .... |
| Provo, Utah | 16.50 | .... | .... | .... |

### DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

| | No. 2 Fdry. | Malleable | Basic | Bessemer |
|---|---|---|---|---|
| Boston and nearby New England | | | | |
| From Everett, Mass. | $18.50 | $19.00 | $18.00 | $19.50 |
| From Buffalo | 18.50 | 19.00 | 18.00 | 19.50 |
| Brooklyn | | | | |
| From East. Pa. or Buffalo | 19.77 | 20.27 | 19.27 | 20.77 |
| Newark or Jersey City, N. J. | | | | |
| From East. Pa. or Buffalo | 18.89 | 19.39 | 18.39 | 19.89 |
| Philadelphia | | | | |
| From Eastern Pa. | 18.26 | 18.76 | 17.76 | 19.26 |
| Cincinnati | | | | |
| From Hamilton, Ohio | 18.51 | 18.51 | 18.01 | 19.01 |
| Canton, Ohio | | | | |
| From Cleveland and Youngstown | 18.76 | 18.76 | .... | .... |
| Columbus, Ohio | | | | |
| From Hamilton, Ohio | 19.50 | 19.50 | .... | .... |
| Mansfield, Ohio | | | | |
| From Cleveland and Toledo | 19.26 | 19.26 | .... | .... |
| Indianapolis | | | | |
| From Hamilton, Ohio | 19.77 | 19.77 | .... | .... |
| South Bend, Ind. | | | | |
| From Chicago | 19.55 | 19.55 | .... | .... |
| Milwaukee | | | | |
| From Chicago | 18.50 | 18.50 | .... | .... |
| St. Paul | | | | |
| From Duluth | 19.44 | .... | .... | .... |
| Davenport, Iowa | | | | |
| From Chicago | 19.26 | 19.26 | .... | .... |
| Kansas City | | | | |
| From Granite City | 20.04 | 20.54 | .... | .... |

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

### LOW PHOSPHORUS PIG IRON

| | |
|---|---|
| Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. | $22.00 |
| Johnson City, Tenn. | 22.00 |
| F.o.b. Valley furnace | 22.00 |
| Del'd Chicago | 27.65 |

### GRAY FORGE PIG IRON

| | |
|---|---|
| Valley furnace | $17.50 |

### CHARCOAL PIG IRON

| | |
|---|---|
| Lake Superior furnace | $20.50 |
| Delivered Chicago | 23.54 |
| Delivered Buffalo | 23.78 |

### CANADA

#### Pig Iron

Per gross ton:

| | |
|---|---|
| Delivered Toronto | |
| No. 1 fdy., sil. 2.25 to 2.75 | $21.00 |
| No. 2 fdy., sil. 1.75 to 2.75 | 20.50 |
| Malleable | 21.00 |
| Delivered Montreal | |
| No. 1 fdy., sil. 2.25 to 2.75 | $22.50 |
| No. 2 fdy., sil. 1.75 to 2.25 | 22.00 |
| Malleable | 22.50 |
| Basic | 22.00 |

#### Ferromanganese

| | *Per Gross Ton* |
|---|---|
| Domestic, 80%, seaboard, (carload) | $82.00 |
| Domestic, 80%, seaboard, (less carloads) | 89.00 |

#### Spiegeleisen

| | *Per Gross Ton Furnace* |
|---|---|
| Domestic, 19 to 21% | $27.00 |

#### Electric Ferrosilicon

| | *Per Gross Ton Delivered* |
|---|---|
| 50% (carloads) | $74.50 |
| 50% (less carloads) | 82.00 |
| 75% (carloads) | 120.00 |
| 75% (less carloads) | 130.00 |
| 14% to 16% (f.o.b.) Welland, Ont. (in carloads) | 31.00 |
| 14% to 16% (less carloads) | 36.00 |

#### Silvery Iron

F.o.b. Jackson, Ohio, Furnace

| *Per Gross Ton* | | *Per Gross Ton* | |
|---|---|---|---|
| 6% | $22.25 | 12% | $29.25 |
| 7% | 23.25 | 13% | 30.75 |
| 8% | 24.25 | 14% | 32.25 |
| 9% | 25.25 | 15% | 33.75 |
| 10% | 26.25 | 16% | 35.25 |
| 11% | 27.75 | 17% | 36.75 |

#### Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

| *Per Gross Ton* | | *Per Gross Ton* | |
|---|---|---|---|
| 10% | $27.25 | 14% | $33.25 |
| 11% | 28.75 | 15% | 34.75 |
| 12% | 30.25 | 16% | 36.25 |
| 13% | 31.75 | 17% | 37.75 |

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

#### Other Ferroalloys

| | |
|---|---|
| Ferrotungsten, per lb. wo. del., carloads | 94c. |
| Ferrotungsten, less carloads | $1.00 |
| Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads | 9.50c. |
| Ferrochromium, 2% carbon | 16.50 to 17.00c. |
| Ferrochromium, 1% carbon | 17.50c. to 18.00c. |
| Ferrochromium, 0.10% carbon | 19.50c. to 20.00c. |
| Ferrochromium, 0.06% carbon | 20.00c. to 20.50c. |
| Ferrovanadium, del., per lb. contained Va. | $2.60 to $2.80 |
| Ferrocarbontitanium, 15 to 18% per net ton, f.o.b. furnace in carloads | 160.00 |
| Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage | 50.00 |
| Ferrophosphorous, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage | 65.00 |
| Ferromolybdenum, per lb. Mo., del. | 95c. |
| Calcium molybdate, per lb. Mo., del. | 80c. |
| Silico spiegel, per ton, f.o.b. furnace, car lots | $36.00 |
| Ton lots or less, per ton | 41.00 |
| Silico-manganese, gross ton, delivered: | |
| 2.50% carbon grade | 85.00 |
| 2% carbon grade | 90.00 |
| 1% carbon grade | 100.00 |
| Spot prices | $5 a ton higher |

#### Ores

*Lake Superior Ores, Delivered Lower Lake Ports*

| | *Per Gross Ton* |
|---|---|
| Old range, Bessemer, 51.5% iron | $4.80 |
| Old range, non-Bessemer, 51.50% iron | 4.65 |
| Mesabi Bessemer, 51.50% iron | 4.65 |
| Mesabi non-Bessemer, 51.50% iron | 4.50 |
| High phosphorous, 51.50% iron | 4.40 |

*Foreign Ore, c.i.f. Philadelphia or Baltimore*

| | *Per Unit* |
|---|---|
| Ircn, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian | 8c. |
| Iron, low phos., Swedish, average 68½% iron | 8.50c. |
| Iron, basic or foundry, Swedish, average, 65% iron | 8c. |
| Iron, basic or foundry, Russian, aver. 65% iron (nom.) | 8c. |
| Manganese, Caucasian, washed 52% | 22c. |
| Manganese, African, Indian, 44-48% | 20c. |
| Manganese, African, Indian, 49-51% | 21c. |
| Manganese, Brazilian, 46 to 48½ | 17c. |
| | *Per Net Ton Unit* |
| Tungsten, Chinese wolframite, duty paid* | $12.00 |
| Tungsten, domestic scheelite* | $11.00 to $12.00 |
| | *Per Gross Ton* |
| Chrome, 45%, $Cr_2O_3$, crude, c.i.f. Atlantic Seaboard | 16.00 |
| Chrome, 48%, $Cr_2O_3$, c.i.f. Atlantic seaboard | 18.00 |

*Quotations nominal in absence of sales.

#### Fluorspar

| | *Per Net Ton* |
|---|---|
| Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines | $15.00 |
| No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines | 16.00 |
| Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid | 18.50 |
| Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines | 30.00 |

# Iron and Steel Scrap

### PITTSBURGH

Per gross ton delivered consumers' yards:

| | |
|---|---|
| No. 1 heavy melting steel | $11.50 to $12.00 |
| No. 2 heavy melting steel | 10.50 to 11.00 |
| No. 2 railroad wrought | 11.50 to 12.00 |
| Scrap rails | 11.50 to 12.00 |
| Rails 3 ft. and under | 14.50 to 15.00 |
| Sheet car crops, ordinary | 13.00 to 13.50 |
| Compressed sheet steel | 11.50 to 12.00 |
| Hand bundled sheet steel | 10.75 to 11.25 |
| Hvy. steel axle turnings | 10.50 to 11.00 |
| Machine shop turnings | 9.00 to 9.50 |
| Short shov. steel turnings | 9.00 to 9.50 |
| Short mixed borings and turnings | 8.00 to 8.50 |
| Cast iron borings | 8.00 to 8.50 |
| Cast iron carwheels | 11.00 to 11.50 |
| Heavy breakable cast | 10.50 to 11.00 |
| No. 1 cast | 11.50 to 12.00 |
| Railr. knuckles and couplers | 13.50 to 14.00 |
| Rail. coil and leaf springs | 13.50 to 14.00 |
| Rolled steel wheels | 13.50 to 14.00 |
| Low phos. billet crops | 15.00 to 15.50 |
| Low phos. sheet bar crops | 14.50 to 15.00 |
| Low phos. plate scrap | 14.00 to 14.50 |
| Low phos. punchings | 14.50 to 15.00 |
| Steel car axles | 14.50 to 15.00 |

### CHICAGO

Delivered Chicago district consumers:

| *Per Gross Ton* | |
|---|---|
| Heavy melting steel | $8.75 to $9.25 |
| Shoveling steel | 8.75 to 9.25 |
| Hydraulic comp. sheets | $7.50 to $8.00 |
| Drop forge flashings | 6.75 to 7.25 |
| No. 1 busheling | 7.25 to 7.75 |
| Rolled carwheels | 10.50 to 11.00 |
| Railroad tires | 10.25 to 10.75 |
| Railroad leaf springs | 10.50 to 11.00 |
| Axle turnings | 7.50 to 8.00 |
| Steel couplers and knuckles | 10.00 to 10.50 |
| Coil springs | 11.00 to 11.50 |
| Axle turnings (elec. fur.) | 7.50 to 8.00 |
| Low phos. punchings | 11.00 to 11.50 |
| Low phos. plates, 12 in. and under | 11.00 to 11.50 |
| Cast iron borings | 5.50 to 6.00 |
| Short shoveling turnings | 5.50 to 6.00 |
| Machine shop turnings | 5.00 to 5.50 |
| Rerolling rails | 10.50 to 11.00 |
| Steel rails, less than 3 ft. | 11.00 to 11.50 |
| Steel rails, less than 2 ft. | 11.50 to 12.00 |
| Angle bars, steel | 10.00 to 10.50 |
| Cast iron carwheels | 9.50 to 10.00 |
| Railroad malleable | 9.00 to 9.50 |
| Agricultural malleable | 7.50 to 8.00 |

| *Per Net Ton* | |
|---|---|
| Iron car axles | $12.00 to $12.50 |
| Steel car axles | 9.00 to 9.50 |
| No. 1 railroad wrought | 7.75 to 8.25 |
| No. 2 railroad wrought | 7.75 to 8.25 |

### Wire Rods

(Common soft, base)

| | *Per Gross Ton* |
|---|---|
| Pittsburgh | $35.00 |
| Cleveland | 35.00 |
| Chicago | 36.00 |
| Birmingham | 38.00 |
| Youngstown (del d) | 36.00 |

## ALLOY STEEL BLOOMS, BILLETS AND SLABS

F.o.b. Pittsburgh, Chicago, Buffalo, Massillon, Canton or Bethlehem.
Base price, $49 a gross ton except at Bethlehem, where it is $51.

## COKE, COAL AND FUEL OIL

### Coke

| | *Per Net Ton* |
|---|---|
| Furnace, f.o.b. Connellsville Prompt | $3.75 |
| Foundry, f.o.b. Connellsville Prompt | $4.25 to 5.75 |
| Foundry, by-product, Chicago ovens, for delivery outside switching districts | 8.00 |
| Foundry, by-product, delivered in Chicago switching district | 8.75 |
| Foundry, by-product, New England, delivered | 10.50 |
| Foundry, by-product, Newark or Jersey City, del'd | 8.20 to 8.81 |
| Foundry, by-product, Phila. | 8.50 |
| Foundry, by-product, Cleveland, delivered | 8.76 |
| Foundry, Birmingham | 4.75 |
| Foundry, by-product, St. Louis, f.o.b. ovens | 8.00 |
| Foundry, by-product, del'd St. Louis | 9.00 |

### Coal

| | *Per Net Ton* |
|---|---|
| Mine run steam coal, f.o.b. W. Pa. mines | $1.55 to $1.80 |
| Mine run coking coal f.o.b. W. Pa. | 1.80 to 2.00 |
| Gas coal, ¾-in., f.o.b. Pa. mines | 2.00 to 2.30 |
| Mine run gas coal, f.o.b. Pa. mines | 1.80 to 2.20 |
| Steam slack, f.o.b. W. Pa. mines | 1.30 to 1.40 |
| Gas slack, f.o.b. W. Pa. mines | 1.65 to 1.85 |

### Fuel Oil

| | |
|---|---|
| *Per Gal. f.o.b. Bayonne, N. J.* | |
| No. 3 distillate | 4.00c. |
| No. 4 industrial | 3.50c. |
| *Per Gal. f.o.b. Baltimore* | |
| No. 3 distillate | 4.00c. |
| No. 4 industrial | 3.50c. |
| *Per Gal. del'd Chicago* | |
| No. 3 industrial fuel oil | 3.73c. |
| No. 5 industrial fuel oil | 3.23c. |
| *Per Gal. f.o.b. Cleveland* | |
| No. 3 distillate | 5.50c. |
| No. 4 industrial | 5.25c. |

## REFRACTORIES

### Fire Clay Brick

| | *Per 1000 f.o.b. Works* High-heat Duty Brick | Intermediate Duty Brick |
|---|---|---|
| Pennsylvania | $45.00 | $40.00 |
| Maryland | 45.00 | 40.00 |
| New Jersey | 55.00 | 43.00 |
| Ohio | 45.00 | 40.00 |
| Kentucky | 45.00 | 40.00 |
| Missouri | 45.00 | 40.00 |
| Illinois | 45.00 | 40.00 |
| Ground fire clay, per ton | 7.00 | |

### Chrome Brick

| | *Per Net Ton* |
|---|---|
| Standard size | $45.00 |

### Silica Brick

| | *Per 1000 f.o.b. Works* |
|---|---|
| Pennsylvania | $45.00 |
| Chicago | 54.00 |
| Birmingham | 55.00 |
| Silica clay, per ton | 8.00 |

### Magnesite Brick

| | *Per Net Ton* |
|---|---|
| Standard sizes, burned, f.o.b. Baltimore and Chester, Pa. | $65.00 |
| Unburned, f.o.b. Baltimore | 52.00 |
| Grain magnesite, f.o.b. Baltimore and Chester, Pa. | 40.00 |
| Domestic, f.o.b Chewelah, Wash. | 22.00 |

## CAST IRON PIPE

| | *Per Net Ton* |
|---|---|
| 4-in. and larger, del'd Chicago | $43.00 to $44.00 |
| 4-in., del'd Chicago | 46.00 to 47.00 |
| 4-in. and larger, del'd New York | 38.00 |
| 4-in., del'd New York | 42.00 |
| 6-in., and larger, Birmingham, | $35.00 to 36.00 |
| 4-in., Birmingham | 38.00 to 39.00 |

Class "A" and gas pipe, $3 extra.

| | | |
|---|---|---|
| No. 2 busheling | $3.50 to | $4.00 |
| Locomotive tires, smooth | 8.50 to | 9.00 |
| Pipe and flues | 4.25 to | 4.75 |
| No. 1 machinery cast | 9.50 to | 10.00 |
| Clean automobile cast | 9.50 to | 10.00 |
| No. 1 railroad cast | 8.00 to | 8.50 |
| No. 1 agricultural cast | 8.25 to | 8.75 |
| Stove plate | 6.50 to | 7.00 |
| Grate bars | 6.25 to | 6.75 |
| Brake shoes | 8.25 to | 8.75 |

## PHILADELPHIA

**Per gross ton delivered consumers' yards:**

| | | |
|---|---|---|
| No. 1 heavy melting steel | | $10.00 |
| No. 2 heavy melting steel | $8.50 to | 9.00 |
| No. 1 railroad wrought | | 11.00 |
| Bundled sheets | 8.00 to | 8.50 |
| Hydraulic compressed, new | | 10.00 |
| Hydraulic compressed, old | 8.00 to | 8.50 |
| Machine shop turnings | | 7.50 |
| Heavy axle turnings | | 9.50 |
| Cast borings | | 7.00 |
| Heavy breakable cast | 10.50 to | 11.00 |
| Stove plate (steel works) | 8.50 to | 9.00 |
| No. 1 low phos. heavy | 13.00 to | 14.00 |
| Couplers and knuckles | 13.00 to | 13.50 |
| Rolled steel wheels | 13.00 to | 13.50 |
| No. 1 blast furnace | 6.00 to | 6.50 |
| Spec. iron and steel pipe | 9.00 to | 9.50 |
| Shafting | 14.50 to | 15.00 |
| Steel axles | 13.50 to | 14.00 |
| No. 1 forge fire | | 10.50 |
| Cast iron carwheels | 11.50 to | 12.00 |
| No. 1 cast | 11.00 to | 12.00 |
| Cast borings (chem.) | 12.00 to | 14.00 |
| Steel rails for rolling | 12.00 to | 12.50 |

## CLEVELAND

**Per gross ton delivered consumers' yards:**

| | | |
|---|---|---|
| No. 1 heavy melting steel | $10.00 to | $10.50 |
| No. 2 heavy melting steel | 9.50 to | 10.00 |
| Compressed sheet steel | 9.00 to | 9.50 |
| Light bundled sheet stampings | 6.50 to | 7.00 |
| Drop forge flashings | 9.00 to | 9.50 |
| Machine shop turnings | 7.00 to | 7.50 |
| Short shoveling turnings | 7.50 to | 8.00 |
| No. 1 busheling | 9.00 to | 9.50 |
| Steel axle turnings | 7.50 to | 8.00 |
| Low phos. billet crops | 12.50 to | 13.00 |
| Cast iron borings | 7.00 to | 7.50 |
| Mixed borings and short turnings | 7.00 to | 7.50 |
| No. 2 busheling | 7.00 to | 7.50 |
| No. 1 cast | 11.00 to | 11.50 |
| Railroad grate bars | 6.50 to | 7.00 |
| Stove plate | 7.50 to | 8.00 |
| Rails under 3 ft. | 10.00 to | 10.50 |
| Rails for rolling | 10.50 to | 11.00 |
| Railroad malleable | 10.00 to | 10.50 |
| Cast iron carwheels | | 11.00 |

## BUFFALO

**Per gross ton, f.o.b. Buffalo consumers' plants:**

| | | |
|---|---|---|
| No. 1 heavy melting steel | $9.00 to | $9.50 |
| No. 2 heavy melting scrap | 8.00 to | 8.50 |
| Scrap rails | 8.50 to | 9.00 |
| New hydraul. comp. sheets | 8.00 to | 8.50 |
| Old hydraul. comp. sheets | 7.50 to | 8.00 |
| Drop forge flashings | 8.00 to | 8.50 |
| No. 1 busheling | 8.00 to | 8.50 |
| Hvy. steel axle turnings | 8.50 to | 9.00 |
| Machine shop turnings | 6.00 to | 6.50 |
| Knuckles and couplers | 11.00 to | 11.50 |
| Coil and leaf springs | 11.00 to | 11.50 |
| Rolled steel wheels | 11.00 to | 11.50 |
| Low phos. billet crops | 12.50 to | 13.00 |
| Short shov. steel turnings | 7.00 to | 7.50 |
| Short mixed borings and turnings | 6.00 to | 6.50 |
| Cast iron borings | 6.00 to | 6.50 |
| No. 2 busheling | 6.00 to | 6.50 |
| Steel car axles | 11.00 to | 12.00 |
| Iron axles | 11.00 to | 12.00 |
| No. 1 machinery cast | 11.00 to | 11.50 |
| No. 1 cupola cast | 11.00 to | 11.50 |
| Stove plate | 8.75 to | 9.25 |
| Steel rails, 3 ft. and under | 12.50 to | 13.00 |
| Cast iron carwheels | 10.00 to | 10.50 |
| Industrial malleable | 10.50 to | 11.00 |
| Railroad malleable | 10.50 to | 11.00 |
| Chemical borings | 9.00 to | 10.00 |

## BIRMINGHAM

**Per gross ton delivered consumers' yards:**

| | | |
|---|---|---|
| Heavy melting steel | $10.00 to | $10.50 |
| Scrap steel rails | | 9.50 |
| Short shoveling turnings | | 5.50 |
| Stove plate | 7.00 to | 7.50 |
| Steel axles | 11.00 to | 11.50 |
| Iron axles | 11.00 to | 11.50 |
| No. 1 railroad wrought | 7.00 to | 7.50 |
| Rails for rolling | | 10.50 |
| No. 1 cast | 9.50 to | 10.00 |
| Tramcar wheels | 9.50 to | 10.00 |
| Cast iron borings, chem. | | 8.00 |

## ST. LOUIS

**Per gross ton delivered consumers' yards:**

| | | |
|---|---|---|
| Selected heavy steel | $9.25 to | $9.75 |
| No. 1 heavy melting | 8.50 to | 9.00 |
| No. 2 heavy melting | 7.50 to | 8.00 |
| No. 1 locomotive tires | 8.50 to | 9.00 |
| Misc. stand.-sec. rails | 9.50 to | 10.00 |
| Railroad springs | 10.00 to | 10.50 |
| Bundled sheets | 6.00 to | 6.50 |
| No. 2 railroad wrought | 8.50 to | 9.00 |
| No. 1 busheling | 6.50 to | 7.00 |
| Cast iron borings and shoveling turnings | 4.75 to | 5.25 |
| Rails for rolling | 10.00 to | 10.50 |
| Machine shop turnings | 4.50 to | 5.00 |
| Heavy turnings | 5.50 to | 6.00 |
| Steel car axles | 11.50 to | 12.00 |
| Iron car axles | 12.50 to | 13.00 |
| Wrot. iron bars and trans. | 9.50 to | 10.00 |
| No. 1 railroad wrought | 6.25 to | 6.75 |
| Steel rails less than 3 ft. | 11.50 to | 12.00 |
| Steel angle bars | 10.00 to | 10.50 |
| Cast iron carwheels | 7.50 to | 8.00 |
| No. 1 machinery cast | 8.50 to | 9.00 |
| Railroad malleable | 9.50 to | 10.00 |
| No. 1 railroad cast | 8.50 to | 9.00 |
| Stove plate | 7.00 to | 7.50 |
| Relay rails, 60 lb. and under | 16.00 to | 16.50 |
| Relay rails, 60 lb. and over | $20.00 to | $21.00 |
| Agricult. malleable | 9.00 to | 9.50 |

## BOSTON

**Dealers' buying prices per gross ton:**

| | | |
|---|---|---|
| No. 1 heavy melting steel | $7.00 to | 7.50 |
| Scrap T rails | 6.75 to | 7.25 |
| Machine shop turnings | 2.75 to | 3.00 |
| Cast iron borings | 4.00 to | 4.25 |
| Bundled skeleton, long | 5.50 to | 6.00 |
| Forge flashings | 4.75 to | 5.00 |
| Blast furnace scrap | 4.75 to | 5.00 |
| Shafting | 9.00 to | 9.50 |
| Steel car axles | 8.50 to | 9.00 |
| Wrought pipe | 3.50 to | 4.00 |
| Rails for rerolling | 6.00 to | 6.50 |
| Cast iron borings, chemical | 7.50 to | 8.00 |

**Per gross ton delivered consumers' yards:**

| | | |
|---|---|---|
| Textile cast | $10.00 to | $11.00 |
| No. 1 machinery cast | 10.00 to | 11.00 |
| Stove plate | 6.25 to | 6.50 |
| Railroad malleable | 11.00 to | 12.00 |

## NEW YORK

**Dealers' buying prices per gross ton:**

| | | |
|---|---|---|
| No. 1 heavy melting steel | $6.50 to | $7.50 |
| No. 2 heavy melting steel | 5.50 to | 6.50 |
| Unprepared yard iron and steel | 2.50 to | 3.00 |
| No. 1 heavy breakable cast | 6.00 to | 6.50 |
| Machine shop turnings | 3.00 to | 3.50 |
| Short shoveling turnings | 3.00 to | 3.50 |
| Cast borings | 4.50 to | 4.75 |
| No. 1 blast furnace | 2.50 to | 3.00 |
| Steel car axles | 10.00 to | 10.50 |
| Spec. iron and steel pipe | $4.50 to | $5.00 |
| Forge fire | 5.50 to | 6.00 |
| No. 1 railroad wrought | 7.50 to | 8.00 |
| No. 1 yard wrought, long | 6.50 to | 7.00 |
| Rails for rolling | 8.50 to | 9.00 |
| No. 1 cast | 7.00 to | 7.25 |
| No. 2 cast | 6.00 to | 6.25 |
| Stove plate | 5.50 to | 6.00 |
| Cast borings (chemical) | 12.00 to | 12.50 |

**Per gross ton, delivered local foundries:**

| | |
|---|---|
| No. 1 machinery cast | $9.00 |
| No. 1 hvy. cast (cupola size) | 8.00 |
| No. 2 cast | 7.00 |

## CINCINNATI

**Dealers' buying prices per gross ton:**

| | | |
|---|---|---|
| Heavy melting steel | $8.25 to | $8.75 |
| Scrap rails for melting | 9.00 to | 9.50 |
| Loose sheet clippings | 4.75 to | 5.25 |
| Bundled sheets | 5.75 to | 6.25 |
| Cast iron borings | 5.75 to | 6.25 |
| Machine shop turnings | 5.25 to | 5.75 |
| No. 1 busheling | 6.50 to | 7.00 |
| No. 2 busheling | 3.25 to | 3.75 |
| Rails for rolling | 9.25 to | 9.75 |
| No. 1 locomotive tires | 8.50 to | 9.00 |
| Short rails | 11.25 to | 11.75 |
| Cast iron carwheels | 8.00 to | 8.50 |
| No. 1 machinery cast | 9.50 to | 10.00 |
| No. 1 railroad cast | 9.00 to | 9.50 |
| Burnt cast | 6.50 to | 7.00 |
| Stove plate | 6.50 to | 7.00 |
| Agricultural malleable | 8.50 to | 9.00 |
| Railroad malleable | 9.00 to | 9.50 |

## DETROIT

**Dealers' buying prices per gross ton:**

| | | |
|---|---|---|
| Heavy melting steel | $7.00 to | $7.50 |
| Borings and short turnings | 5.75 to | 6.25 |
| Long turnings | 5.25 to | 5.75 |
| No. 1 machinery cast | 7.50 to | 8.00 |
| Automotive cast | 9.50 to | 10.00 |
| Hydraul. comp. sheets | 7.00 to | 7.50 |
| Stove plate | 5.75 to | 6.25 |
| New factory busheling | 6.00 to | 6.50 |
| Old No. 2 busheling | 5.00 to | 5.50 |
| Sheet clippings | 4.75 to | 5.25 |
| Flashings | 5.75 to | 6.25 |
| Low phos. plate scrap | 7.75 to | 8.25 |

## CANADA

**Dealers' buying prices per gross ton:**

| | Toronto | Montreal |
|---|---|---|
| Heavy melting steel | $5.50 | $5.50 |
| Rails, scrap | 6.00 | 6.00 |
| Machine shop turnings | 2.50 | 2.50 |
| Boiler plate | 4.50 | 4.50 |
| Heavy axle turnings | 2.50 | 2.50 |
| Cast borings | 3.00 | 3.00 |
| Steel borings | 2.00 | 2.00 |
| Wrought pipe | 2.50 | 2.50 |
| Steel axles | 4.50 | 6.00 |
| Axles, wrought iron | 4.50 | 6.00 |
| No. 1 machinery cast | 7.75 | 9.00 |
| Stove plate | 4.50 | 5.00 |
| Standard carwheels | 7.25 | 7.00 |
| Malleable | 6.75 | 7.00 |

# Warehouse Prices for Steel Products

## PITTSBURGH

| | Base per Lb. |
|---|---|
| Plates | 2.85c. |
| Structural shapes | 2.85c. |
| Soft steel bars and small shapes | 2.60c. |
| Reinforcing steel bars | 2.60c. |
| Cold-finished and screw stock— | |
| Rounds and hexagons | 3.20c. |
| Squares and flats | 3.20c. |
| Hoops and bands, under ¼ in. | 2.95c. |
| Hot-rolled annealed sheets (No. 24), 25 or more bundles | 3.15c. |
| Galv. sheets (No. 24), 25 or more bundles | 3.50c. |
| Hot-rolled sheets (No. 10) | 2.50c. |
| Galv. corrug. sheets (No. 28), per square (more than 3750 lb.) | $3.32 |
| Spikes, large | 2.40c. |
| Small | 2.65c. |
| Boat | 2.90c. |

Track bolts, all sizes, per 100 count, 65 per cent off list.

Machine bolts, 100 count, **65 per cent off list.**

Carriage bolts, 100 count, 65 per cent off list.

Nuts, all styles, 100 count, 70 per cent off list.

| | |
|---|---|
| Large rivets, base per 100 lb. | $3.25 |
| Wire, black, soft ann'l'd, base per 100 lb. | 2.90 |
| Wire, galv. soft, base per 100 lb. | 3.35 |
| Common wire nails, per keg | 2.40 |
| Cement coated nails, per keg | 2.40 |

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 3999 lb.

## CHICAGO

| | Base per Lb. |
|---|---|
| Plates and structural shapes | 3.10c. |
| Soft steel bars | 2.90c. |
| Cold-fin. steel bars and shafting | |
| Rounds and hexagons | 3.25c. |
| Flats and squares | 3.25c. |
| Bands, 3/16 in. (in Nos. 10 and 12 gages) | 3.20c. |
| Hoops (No. 14 gage and lighter) | 3.20c. |
| Hot-rolled annealed sheets (No. 24) | 3.70c. |
| Galv. sheets (No. 24) | 4.30c. |
| Hot-rolled sheets (No. 10) | 2.85c. |
| Spikes (9/16 in. and lighter) | 3.50c. |
| Track bolts | 4.50c. |
| Rivets, structural (keg lots) | 3c. |
| Rivets, boiler (keg lots) | 3.10c. |

| | Per Cent Off List |
|---|---|
| Machine bolts | 60 |
| Carriage bolts | 65 |
| Coach and lag screws | 65 |
| Hot-pressed nuts, sq., tap. or blank | 65 |
| Hot-pressed nuts, hex., tap. or blank | 65 |
| Hex. head and cap screws | 80 and 10 |
| Cup point set screws | 75 |
| Flat head bright wood screws | 50 and 10 |
| Spring cotters | 60 and 10 |
| Stove bolts | 72½ |
| Rd. hd. tank rivets, 7/16 in. and smaller | 65 |
| Wrought washers | $5.50 off list |
| No. 8 black ann'l'd wire per 100 lb. | $3.45 |
| Com. wire nails, base per keg | 2.70c. |
| Cement c't'd nails, base per keg | 2.70c. |

## NEW YORK

| | Base per Lb. |
|---|---|
| Plates | 3.30c. |
| Structural shapes | 3.27c. |
| Soft steel bars, small shapes | 3.17c. |
| Iron bars | 3.24c. |
| Iron bars, swed. charcoal | 6.50c. to 7.00c. |
| Cold-fin. shafting and screw stock; | |
| Rounds and hexagons | 3.79c. |
| Flats and squares | 4.29c. |
| Cold-roll. strip, soft and quarter hard | 4.00c. |
| Hoops | 3.42c. |
| Bands | 3.42c. |
| Hot-rolled sheets (No. 10) | 3.17c. |
| Hot-rolled ann'l'd sheets (No. 24*) | 3.65c. |
| Galvanized sheets (No. 24*) | 4.25c. |
| Long terne sheets (No. 24) | 4.75c. |
| Standard tool steel | 12.00c. |
| Wire, black annealed (No. 10) | 3.60c. |
| Wire, galv. annealed (No. 10) | 4.05c. |
| Tire steel ½ x ½ in. and larger | 3.40c. |
| Smooth finish, 1 to 2½ x ¼ in. and larger | 3.75c. |
| Open hearth spring steel, bases | 3.75c. to 10.00c. |
| Common wire nails, base, per keg | $3.00 |

| | Per Cent Off List |
|---|---|
| Machine bolt, cut thread: | |
| ¾ x 6 in. and smaller | 65 |
| 1 x 30 in. and smaller | 65 |
| Carriage bolts, cut thread: | |
| ½ x 6 in. and smaller | 65 |
| ¾ x 20 in. and smaller | 65 |

| | Per 100 Ft. |
|---|---|
| Boiler tubes: | |
| Lap welded, 2-in. | $18.05 |
| Seamless welded, 2-in. | 19.24 |
| Charcoal iron, 2-in. | 24.94 |
| Charcoal iron, 4-in. | 63.65 |

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

## ST. LOUIS

| | Base per Lb. |
|---|---|
| Plates and struc. shapes | 3.34c. |
| Bars, soft steel or iron | 3.14c. |
| Cold-fin. rounds, shafting, screw stock | 3.59c. |
| Hot-rolled annealed sheets (No. 24) | 3.94c. |
| Galv. sheets (No. 24) | 4.54c. |
| Hot-rolled sheets (No. 10) | 3.19c. |
| Black corrug. sheets (No. 24) | 3.65c. |
| Galv. corrug. sheets | 4.30c. |
| Structural rivets | 3.34c. |
| Boiler rivets | 3.44c. |

| | Per Cent Off List |
|---|---|
| Tank rivets, 7/16 in. and smaller | 65 |
| Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts | |
| 1000 lb. or over | 65 |
| 200 to 999 lb. | 60 |
| 100 to 199 lb. | 55 |
| Less than 100 lb. | 50 |

## PHILADELPHIA

| | Base per Lb. |
|---|---|
| *Plates, ¼-in. and heavier | 2.60c. |
| *Structural shapes | 2.60c. |
| *Soft steel bars, small shapes, iron bars (except bands) | 2.60c. |
| Reinforc. steel bars, sq., twisted and deform. | 2.30c. |
| Cold-finished steel bars | 3.58c. |
| *Steel hoops | 3.15c. |
| *Steel bands, No. 12 to 3/16 in., incl. | 2.90c. |
| Spring steel | 5.00c. |
| †Hot-rolled annealed sheets (No. 24) | 3.40c. |
| ‡Galvanized sheets (No. 24) | 4.00c. |
| *Hot-rolled annealed sheets (No. 10) | 2.75c. |
| Diam. pat. floor plates, ¼ in. | 4.35c. |
| Swedish iron bars | 6.00c. |

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

## CLEVELAND

| | Base per Lb. |
|---|---|
| Plates and struc. shapes | 3.21c. |
| Soft steel bars | 2.90c. |
| Reinforc. steel bars | 2.00c. to 2.50c. |
| Cold-fin. steel bars: | |
| Rounds, squares, hexagons | 3.25c. |
| Flats | 3.40c. |
| Flat rolled steel under ¼ in. | 3.26c. |
| Cold-finished strip | 5.55c. |
| Hot-rolled annealed sheets (No. 24) | 3.76c. |
| Galvanized sheets (No. 24) | 4.36c. |
| Hot-rolled sheets (No. 10) | 3.01c. |
| Black ann'l'd wire, per 100 lb. | $2.55 |
| No. 9 galv. wire, per 100 lb. | 2.90 |
| Com. wire nails, base per keg | 2.35 |

*Net base, including boxing and cutting to length.

## CINCINNATI

| | Base per Lb. |
|---|---|
| Plates and struc. shapes | 3.30c. |
| Bars, soft steel or iron | 3.10c. |
| New billet reinforc. bars | 3.10c. |
| Rail steel reinforc. bars | 3.10c. |
| Hoops and bands, 3/16 in. and lighter | 3.35c. |
| Cold-finished bars | 3.55c. |
| Hot-rolled annealed sheets (No. 24) | 3.45c. |
| Galv. sheets (No. 24) | 4.45c. |
| Hot-rolled sheets (No. 10) | 3.10c. |
| Structural rivets | 4.00c. |
| Small rivets | 60 per cent off list |
| No. 9 ann'l'd wire, per 100 lb. | $3.00 |
| Com. wire nails, base per keg (10 to 49 kegs) | 2.60 |
| Larger quantities | 2.50 |
| Cement c't'd nails, base 100-lb. keg | 2.95 |
| Chain, 1-in., per 100 lb. | 8.25 |

| | Net per 100 Ft. |
|---|---|
| Seamless steel boiler tubes, 2-in. | $16.85 |
| 4-in. | 37.20 |
| Hot-welded steel boiler tubes, 2-in. | 15.05 |
| 4-in. | 34.00 |

## BUFFALO

| | Base per Lb. |
|---|---|
| Plates and struc. shapes | 3.20c. |
| Soft steel bars | 2.90c. |
| Reinforcing bars | 1.95c. |
| Cold-fin. flats and sq. | 3.25c. |
| Rounds and hex. | 3.25c. |
| Cold-rolled strip steel | 5.25c. |
| Hot-rolled annealed sheets (No. 24) | 3.25c. |
| Galv. sheets (No. 24) | 4.00c. |
| Bands | 3.30c. |
| Hoops | 3.55c. |
| Hot-rolled unannealed sheets | 3.10c. |
| Com. wire nails, base per keg | $3.00 |
| Black wire, base per 100 lb. | 3.25 |

## BOSTON

| | Per Lb. |
|---|---|
| *Beams, channels, angles, tees, zees | 2.75c. |
| *H beams and shapes | 2.75c. |
| *Plates—sheared, tank and univ. mill, ¼ in. thick and heavier | 2.75c. |
| *Floor plates, diamond pattern | 4.65c. |
| *Bar and bar shapes (mild steel) | 2.65c. |
| *Bands 3/16 in. thick and No. 12 ga. incl. | 3.15c. to 3.65c. |
| Hoops, No. 14 ga. and lighter | 4.90c. to 5.40c. |
| *Half rounds, half ovals, ovals and bevels | 3.90c. |
| Tire steel, std. edge 1½ x ½ in. and larger | 4.50c. |
| Smaller sizes | 4.75c. |
| Cold-finished rounds and hexagons | 3.70c. |
| Cold-rolled strip steel | 5.20c. |
| Cold-finished squares and flats | 4.30c. |
| *Blue annealed sheets, No. 10 ga. | 2.65c. |
| One pass cold-rolled sheets No. 24 ga. | 3.50c. |
| Blued stove pipe sheets, No. 24 ga. | 3.90c. |
| Galvanized steel sheets, No. 24 ga. | 4.00c. |
| Lead coated (long ternes) No. 24 ga. | 5.00c. |

Base prices for 40,000 lb. orders; extra apply for smaller quantities.

## PACIFIC COAST

| | Base per Lb. | | | |
|---|---|---|---|---|
| | San Francisco | Los Angeles | Seattle |
| Plates, tank and U.M. | 3.50c. | 3.30c. | 3.90c. |
| Shapes, standard | 3.55c. | 3.30c. | 3.90c. |
| Wide-flanged beams and columns | 3.75c. | 3.50c. | 4.10c. |
| Soft steel bars | 4.05c. | 3.30c. | 3.90c. |
| Reinforcing bars | 3.15c. | 3.15c. | 3.50c. |
| Hot-rolled annealed sheets (No. 24) | 4.25c. | 4.05c. | 4.75c. |
| Hot-rolled sheets (No. 10) | 3.75c. | 3.45c. | 4.15c. |
| Galv. sheets (No. 24) | 4.85c. | 4.65c. | 5.35c. |
| Struc. rivets, ½ in. and larger | 5.75c. | 5.75c. | 5.25c. |
| Cold finished steel Rounds | 5.95c. | 5.85c. | 6.00c. |
| Squares and hexagons | 7.20c. | 7.10c. | 7.25c. |
| Flats | 7.70c. | 7.60c. | 8.25c. |
| Common wire nails —base per keg | $2.90 | $3.00 | $2.90 |
| less carload | | | |

All items subject to differentials for quantity.

## General Electric Orders Increasing

THE General Electric Co., Schenectady, N. Y., reports sales billed for the first nine months of 1933 at $97,426,200, compared with $113,049,500 for the corresponding 1932 period, a decrease of 14 per cent. Orders received for the same period totaled $104,785,000, compared with $94,374,100 in the first nine months of 1932, an increase of 11 per cent. The third quarter orders amounted to $43,733,500, compared with $25,665,400 in the third quarter last year, an increase of 70 per cent.

## Business Decline for September Is Reported

FURTHER retardation in business activity has been shown in the last six weeks, according to the conference of statisticians in industry of the National Industrial Conference Board. A decline in general production and less than seasonal advances in primary distribution and in consumer buying were evident in September.

The cost of living in September advanced 1.3 per cent over August to a level almost 9 per cent above the April low. Employment in manufacturing industry showed a more than seasonal advance in September as compared with August. Weekly earnings per worker moved up slightly, as did hourly earnings. Hours worked per week declined slightly.

## Air Sizing Device for Hydraulic Grinder

(*Concluded from Page* 36)

eration. Through the medium of solenoids and hydraulic valves the device may be made to control as many machine movements as necessary. It is said to size well within the limits of 0.00025 in.

Operation is based on the principle that if air is escaping from a pressure line the pressure in this line is affected by the size and shape of the outlet through which it is escaping. This change in pressure is used to change the level of the mercury in a U-tube to close contacts and consitutes a mercury switch which controls feeds and other machine movements.

A typical external grinding application is here illustrated. Placed between centers, the work rests lightly against two diamond points with the air outlet between. As grinding proceeds, the sizing head swings slightly upward, decreasing the size of the gap between the work and the outlet. Pressure builds up slowly in the air line, causing the mercury to rise in the U-tube. Just before the work reaches finished size the mercury touches a contact completing an electrical circuit and energizing a solenoid which slows down the feeding in movement. Grinding continues until finish size is reached, the mercury having then risen in the tube until it touches a second contact, this completes a second electrical circuit, energizing a second solenoid, and causing the wheel to move rapidly away from the work. Should the nature of the work permit it, the wheel may be caused to feed back from the work without the insertion of the slower feeding-in movement.

The second illustration shows an internal grinding application. The tube which carries the air to the ground surface, is plainly visible below the grinding wheel. It does not come in contact with the work. In some applications a second tube is used, as shown. As grinding proceeds and the inside diameter of the hole increases, the size of the gap between the outlet and the work increases. Pressure in the line gradually decreases.

Air pressure from 2 to 20 lb. per sq. in. is used. Any shop air line may serve as the source for this pressure as two reducing valves reduce it to the desired amount. An air filter is used in the pressure line.

CONSISTENT specification of Wyckoff Cold Drawn Bars will assure you of bar stock that is absolutely uniform, unvarying in cross section and readily machinable. Such precision and perfection are obtainable only with COLD DRAWN STEEL BARS, as produced by the Wyckoff organization.

As the largest exclusive manufacturer of Cold Drawn Steels, we are in a position to show how you may effect many worth-while economies in the selection of YOUR steel. Let us cooperate with you.

**WYCKOFF DRAWN STEEL COMPANY**

GENERAL OFFICES—Ambridge, Penna.
MILLS—Ambridge, Penna. and Chicago, Ill.

# Administration's Monetary Declaration Curbs Weakness in Non-Ferrous Metals

## Copper Strengthens as Tentative Parcels Are Offered at 7.75c.—Lead Steadies at 4c.—Zinc Quiet—Tin Advances With Sterling

NEW YORK, Oct. 24.—As action progressed toward controlled domestic currency and the dollar position weakened abroad, electrolytic copper steadied at 7.62½c. a lb., delivered Connecticut. Consumer response improved on the first signs of hardening, and the entrance of professional interests in the market is tending to force quotations to 7.75c. Throughout the week market offerings were uncertain as smelters offered positions into January at prices ranging from 7.37½c. to 7.50c., while a number of speculative parcels were liquidated at the lower level. Custom smelters have disposed of over 8000 tons of metal at the prices under 9c., and are in a comparatively comfortable position with regard to scrap stocks. Mine producers continue out of the market as bids are nominally held at 9c. Export copper, during the week, ranged from 7.45c. to the current position of 7.65c. to 7.70c. a lb., c.i.f. usual Continental ports. Trading was spirited as quotations forged upward, and both African and American interests booked moderate tonnages at the higher levels this morning. The improved European market for scrap has not succeeded in drawing noticeable quantities from this country, and scrap sellers are inclined to withhold action until the market trend is more clearly defined.

### Tin

The precipitous drop of dollar exchange in London with subsequent fluctuations is effectively discouraging consumer buying. Today, sterling ranged between $4.66 and $4.72½, and importers succeeded in placing a little tonnage at 48c., New York. As stocks of consumers are at a comparatively high level, it is doubtful whether trading will reappear in volume until price fluctuations subside. London prices started to harden on Monday, and postings on first call this morning were £222 17s. 6d. for spot standard, £222 15s. for future standard, and £228 7s. 6d. for spot Straits.

### Zinc

In contrast with other metals, spelter remains inactive at an untested level of 4.75c. a lb., East St. Louis, and 5.12c., New York. Prime Western sales are confined to routine trading, which, during the past seven-day period, accounted for more than 1000 tons, the major portion of which was booked at 4.75c. Several speculative parcels, however, were disposed of at prices ranging from 4.72½c. to 4.70c. Inquiry is decidedly limited, and users are avoiding active participation in the market until the trend is more clearly defined. Since current needs are well covered, increased activity depends upon consumers recognizing the advisability of covering future positions. Joplin concentrates remain easy at $31 a ton, with output for the week totaling 6600 tons. Sales approximated 4500 tons and shipments were 7050 tons. Total stocks in bins are currently estimated at 9900 tons. Leading miners are taking a more definite stand on action to curtail production to within a proximity of demand. Operating schedules are expected to be reduced 15 to 20 per cent during October, which should strengthen the ore market, and in turn should be reflected in higher prices for refined metal.

### Lead

Dropping $10 a ton in less than two weeks, refined metal leveled off at 4c. a lb., New York, on Thursday. As a result of the strengthening in other commodities, consumers are taking advantage of the 4c. price to buy November supplies, as estimated requirements for that month are less than 50 per cent covered. Observers contend that current quotations represent the bottom of the price movement unless consumers decide to ignore all offerings. Additional steadiness is resulting from a better European tone and a lower dollar position which raised the import parity of pig lead considerably above 4.50c., New York. First hands in the Mid-West reduced their price differential from 15 to 10 points, and metal is currently available at 3.90c., St. Louis. Sellers are not seeking commitments at that level, and, as a consequence, sales are light. Reversing the successive declines of the three preceding months, September output exceeded shipments by 5800 tons, which raised visible supplies to 166,055 tons. Shipments were up to market expectations, but smelter activity was generally increased to accelerate conversion of stocked concentrates.

### The Week's Prices. Cents Per Pound for Early Delivery

| | Oct. 18 | Oct. 19 | Oct. 20 | Oct. 21 | Oct. 23 | Oct. 24 |
|---|---|---|---|---|---|---|
| Electrolytic copper, N. Y.* | 7.25 | 7.25 | 7.25 | 7.25 | 7.37½ | 7.37½–7.50 |
| Lake copper, New York | 7.75 | 7.75 | 8.00 | 8.00 | 8.00 | 8.00 |
| Straits tin, Spot, N. Y. | 46.70 | 46.25 | 46.12½ | .... | 47.12½ | 48.12½ |
| Zinc, East St. Louis | 4.75 | 4.75 | 4.75 | 4.75 | 4.75 | 4.75 |
| Zinc, New York | 5.12 | 5.12 | 5.12 | 5.12 | 5.12 | 5.12 |
| Lead, St. Louis | 4.00 | 3.90 | 3.90 | 3.90 | 3.90 | 3.90 |
| Lead, New York | 4.10 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.75c. a lb., New York.
Brass ingots, 85-5-5-5, 8c. a lb., New York and Philadelphia.

### From New York Warehouse

*Delivered Prices, Base per Lb.*

| | |
|---|---|
| Tin, Straits pig | 49.25c. to 50.25c. |
| Tin, bar | 51.25c. to 52.25c. |
| Copper, Lake | 9.25c. to 10.00c. |
| Copper, electrolytic | 9.00c. to 9.50c. |
| Copper, castings | 8.75c. to 9.75c. |
| *Copper sheets, hot-rolled | 17.12½c. |
| *High brass sheets | 14.75c. |
| *Seamless brass tubes | 16.37½c. |
| *Seamless copper tubes | 16.62½c. |
| *Brass rods | 12.25c. |
| Zinc, slabs | 6.00c. to 7.00c. |
| Zinc sheets (No. 9), casks | 9.75c. to 10.00c. |
| Lead, American pig | 5.00c. to 6.00c. |
| Lead, bar | 6.00c. to 7.00c. |
| Lead, sheets | 7.75c. |
| Antimony, Asiatic | 8.50c. to 9.50c. |
| Alum., virgin, 99 per cent plus | 23.30c. |
| Alum., No. 1 for remelting, 98 to 99 per cent | 18.00c. to 19.00c. |
| Solder, ½ and ½ | 29.50c. to 30.50c. |
| Babbitt metal, commercial grade | 25.00c. to 50.00c. |

*These prices are also for delivery from Chicago and Cleveland warehouses.

### From Cleveland Warehouse

*Delivered Prices per Lb.*

| | |
|---|---|
| Tin, Straits pig | 50.75c. |
| Tin, bar | 52.75c. |
| Copper, Lake | 9.125c. to 9.25c. |
| Copper, electrolytic | 9.125c. to 9.25c. |
| Copper, castings | 8.785c. to 9.00c. |
| Zinc, slab | 5.75c. to 6.00c. |
| Lead, American pig | 5.00c. to 5.25c. |
| Lead, bar | 8.00c. |
| Antimony, Asiatic | 9.00c. |
| Babbitt metal, medium grade | 19.50c. |
| Babbitt metal, high grade | 56.00c. |
| Solder, ½ and ½ | 30.25c. |

### Old Metals, Per Lb., New York

*Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)*

| | Dealers' Buying Prices | Dealers' Selling Prices |
|---|---|---|
| Copper, hvy. crucible | 5.75c. | 7.50c. |
| Copper, hvy. and wire | 5.75c. | 7.25c. |
| Copper, light and bottoms | 5.00c. | 5.75c. |
| Brass, heavy | 3.50c. | 4.00c. |
| Brass, light | 3.00c. | 3.50c. |
| Hvy. machine composition | 4.50c. | 5.25c. |
| No. 1 yel. brass turnings | 4.25c. | 5.00c. |
| No. 1 red brass or compos. turnings | 4.00c. | 4.75c. |
| Lead, heavy | 3.50c. | 3.875c. |
| Zinc | 2.75c. | 3.25c. |
| Cast aluminum | 7.50c. | 8.75c. |
| Sheet aluminum | 11.50c. | 13.00c. |

# Hardening Cast Iron by Heat Treatment

(*Concluded from Page 27*)

appears to be no more troublesome than in the case of steel and its alloys. This is astonishing and the importance of this experience cannot be over emphasized. Accompanying illustrations were selected deliberately to demonstrate the possibilities of hardening castings of complex form.

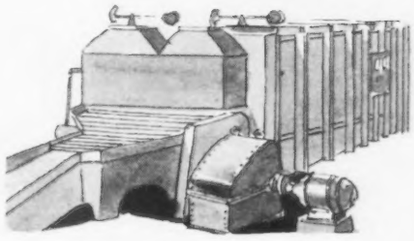
In view of the weakness of the materials in the hardened condition extra precautions are necessary to avoid the risk of rough handling until after the tempering stage. In the case of castings of specially complex and intricate form considerable benefit is derived from the adoption of a preliminary stabilizing treatment with the primary object of removing or minimizing the effect of casting or other internal stresses. The necessity for such stabilizing treatments will, of course, depend upon individual circumstances and experience.

The benefit derived from stabilizing treatments has become more familiar with the extensive adoption of the nitrogen hardening process to both steel and cast irons. Generally such treatments are carried out at low temperatures. For cast irons the temperatures recommended generally are 500 to 600 deg. C. The choice of the exact temperatures and the period of the treatment are determined by the particular circumstances and in general the parts are maintained at the chosen temperature for a given period and allowed to cool down either slowly with the furnace or in still air.

The high temperature annealing treatment can be recommended also in certain cases. Such treatments are generally carried out by heating at 825 to 900 deg. C. followed by slow cooling in the furnace. Excessive annealing is in the case of most cast irons accompanied by considerable loss of combined carbon and furthermore it may be accompanied by serious deterioration in the strength properties.

The exact procedure followed in the production of hardened and tempered castings will depend upon the nature and particular requirements of the castings. If no machining whatever is required then the castings can be hardened and tempered in the rough state. In those cases where intense accuracy of dimensions is not required or where surface appearance is of no importance, the hardening and tempering operations can be carried out as the final operation after all the machining has been completed.

There are also many cases where the castings can be hardened and tempered in the rough state and the surfaces required to be machined finished afterward, by grinding. In the majority of cases a certain amount of machining will be required on the



rough castings prior to hardening and tempering after which treatment the final surfaces are finished by grinding. Selective hardening can be practiced readily by a variety of different methods and procedures similar to those employed in the heat treatment of steel parts.

The decision as to whether oil hardening or air hardening compositions are to be adopted for a given part will be governed primarily by the cost. Air hardening compositions in that they generally contain more nickel are more expensive. In the case of castings of very complicated section the elimination of the liquid quenching operation may be considered advisable, thus leading to the adoption of air hardening materials. In this connection it will be remembered that air hardening is accompanied by similar constitutional changes as oil hardening and the liability to cracking on this account is therefore not diminished.

A few examples of castings which have been successfully oil hardened and tempered are included in the Figs. 6 to 9. Each of these are of a reasonable degree of complexity and at first sight might appear to present difficulties in quenching. It is a fact that no difficulties were experienced and with reasonable care and precautions such as are generally exercised in heat treatment of this kind the author is of the opinion that the hardening and tempering of alloy cast-iron articles can be carried with the same facility as with alloy steels.

## Die Steel Is Cast To Shape

A NEW cast-to-shape, oil-hardening die steel known as K.O.H. has been developed by the Kinite Corpn., Milwaukee and Fairmont, W. Va. It is particularly adapted for making cast-to-shape dies for use on shorter production schedules, where first costs weigh heavily in the final per piece cost, but where exceptional resistance to wear is essential.

In listing advantages of the new K.O.H steel, the manufacturer points out that "pouring" to shape is less expensive and quicker than cutting to shape. K.O.H. can be cast to any shape with very little machining time required, and dies made from it are quickly made ready to go into production.

K.O.H. steel is a companion product to Kinite, a cast-to-shape steel alloy which, because of its long-wearing qualities, is used in tools and dies on unlimited production schedules.


**IMMEDIATE SHIPMENT**

Hy-ten Alloy Steels
Economo Alloy Steels
Whelco Tool Steels
Hy-ten S.A.E. Steels

*Data sheets gladly sent on request*

**WHEELOCK, LOVEJOY & CO., INC.**

CAMBRIDGE CHICAGO CLEVELAND NEW YORK

# PLANT EXPANSION AND EQUIPMENT BUYING

## NEW ENGLAND

**Bureau of Supplies and Accounts,** Navy Department, Washington, has secured appropriation of $74,960 for tools and mechanical equipment for Naval Torpedo Station, Newport, R. I. Early call for bids is planned. Public Works Officer, same station, asks bids until Nov. 8 for construction of two new piers. (Specification 7468).

**E. Ingraham Co.,** North Main Street, Bristol, Conn., manufacturer of clocks, clock mechanisms, etc., has let general contract to Torrington Building Co., Torrington, Conn., for one-story addition, about 18,000 sq. ft. floor space. Cost over $30,000 with equipment. Max J. Unkelbach, 52 North Main Street, New Britain, Conn., is architect.

**Providence Mfg. Co.,** Providence, R. I., has been organized by M. E. Stayner, 133 Somerset Street, and others, to manufacture metal products.

**Hub Tool & Die Co.,** Boston, recently organized, has leased space in building at 791 Tremont Street for new works.

**Committee on City Property,** City Hall, Springfield, Mass., has asked bids on general contract for Board of Education for addition to technical high school, Elliott and Spring Streets. Cost about $350,000 with equipment. E. C. and G. C. Gardner, and Frank W. S. King, 33 Lyman Street, are architects.

**State Department of Mental Diseases,** State House, Boston, has plans for addition to power house at Boston State Hospital, including improvements in present plant. Cost $422,000 with equipment. Financing has been arranged. R. D. Kimball Co., 6 Beacon Street, is consulting engineer.

**American Tube Works,** Somerville, Mass., has been acquired by new interests, headed by Walter E. O'Hara, Fall River, Mass., who has been elected president and treasurer, succeeding, respectively, Walter B. Grant and John J. Dervan. Plans are under way for installation of new equipment for copper tube and pipe manufacture. Plant employs about 800 persons and is now running close to capacity schedule.

## NORTH ATLANTIC

**Board of Education,** Park Avenue and Fifty-ninth Street, New York, plans manual training department in new multi-story high school at Bayside, L. I. Cost $2,500,000, of which about $555,000 will be expended for mechanical equipment. Financing is being arranged.

**Third Avenue Railway System,** 239 Third Avenue, New York, plans three-story car house, with shop and repair facilities, at 1401 Amsterdam Avenue. Cost over $40,000 with equipment. J. E. King, 1119 Third Avenue, is company architect.

**Steel Rolling Co., Inc.,** Jamaica, L. I., has been organized by Mervin C. Pollack, 87-15 167th Street, and associates, capital $80,000 and 200 shares stock, no par value, to operate a rolling mill.

**Bureau of Yards and Docks,** Navy Department, Washington, plans radio station at Sandy Hook, New York Harbor. Cost $46,500 with equipment. Appropriation authorized.

**Interboro Beverage Corpn.,** 165-207 Melrose Street, Brooklyn, has authorized plans for extensions and improvements in steam power plant. Cost over $100,000 with equipment. Shampan & Shampan, 188 Montague Street, are architects.

**Swift & Co., Inc.,** 32 Tenth Avenue, New York, meat packer, has let general contract to Wilcox Construction Co., 25-21 Forty-first Street, Long Island City, for four-story and basement public market and distributing plant at West Thirteenth and Washington Streets, 103 x 150 ft. Cost about $200,000 with equipment.

**Manhattan Cooperage Co.,** 516 West Twenty-fifth Street, New York, manufacturer of wire-bound kegs, barrels, etc., has leased five-story building at 123-27 Bank Street, for new plant unit.

**Board of Education,** Manhasset, L. I., plans manual training department in new multi-story high school on 21-acre tract of land just purchased. Cost about $500,000 with equipment. Tooker & Marsh, 101 Park Avenue, New York, are architects.

**Jellinek Auto Radiator Co., Inc.,** New York, has been organized by Alfred J. and Alfred D. Phillips, 102-21 Ninety-third Avenue, Queens, L. I., and associates, to manufacture automobile radiators and other sheet metal products.

**Commercial Solvents Corpn.,** 230 Park Avenue, New York, has let general contracts to Glenn R. North Construction Co., Ninth Street, Terre Haute, Ind., and Walter R. Heath Construction Co., Greencastle, Ind., for additions and improvements to plant at Terre Haute, to include equipment and facilities for grain alcohol production. Cost over $100,000 with machinery. Company recently acquired part of properties of Rossville Alcohol & Chemical Corpn., Lawrenceburg, Ind., and is concentrating production at Terre Haute plant.

**Supervising Architect,** Treasury Department, Washington, asks bids until Oct. 30 for steel shelving for parcel post office building, New York.

**International Mining Corpn.,** 29 Broadway, New York, has acquired properties of Granite Gold Mining Co., Cripple Creek, Colo., and will carry out development for gold production on two major properties, including equipment for mining, ore loading, hoisting, conveying, etc.

**David Kahn, Inc.,** 68 Paterson Plank Road, North Bergen, N. J., manufacturer of steel pens, pencils, etc., has purchased one-story plant, 28,000 sq. ft. floor space, on Grand Avenue, which will be improved and one-story addition, about 15,000 sq. ft., built. Equipment will be installed for more than twice present production. Cost over $50,000.

**Borough Council,** Princeton, N. J., plans new municipal incinerator plant, with power house, loading, conveying and other equipment. Cost $35,000 with machinery. Financing has been arranged.

**Marvin Machine & Mfg. Co., Inc.,** Bogota, N. J., has been organized by Marvin J. and Harry M. Brinkerhoff, 53 West Fort Lee Road, to manufacture machinery and other equipment.

**Commanding Officer,** Signal School, Fort Monmouth, N. J., plans call for bids early in November for new forge and blacksmith shop, quartermaster warehouses, garage, utility shops, incinerator plant and other structures. Early in December bids will be asked for new Signal Corps laboratory and headquarters building. Appropriation of $796,667 was recently secured for new buildings and equipment at school.

**Sandy Run Colliery,** Hazleton, Pa., plans rebuilding mechanical shop and operating building recently destroyed by fire. Loss about $50,000 with equipment.

**Architects Corpn.,** Bulletin Building, Philadelphia, has plans for new three-story storage and distributing plant in Frankford district for distilling company whose name is temporarily withheld. Cost over $100,000 with equipment.

**E. I. du Pont de Nemours & Co.,** du Pont Building, Wilmington, Del., has plans for addition to industrial chemical plant at Deepwater Point, N. J. Cost about $100,000 with equipment.

**Board of Education,** Wilmington, Del., plans manual training department in new multi-story senior high school on 4-acre tract at Thirty-fourth and Monroe Streets. Early call will be made for bids. Cost $1,500,000 with equipment. Financing has been arranged.

**Penn Screw & Machine Works,** Philadelphia, maker of screw machine products, is removing factory and offices from 708 Cherry Street to 446 North Thirteenth Street, effective Nov. 1.

**Cameron Foundry,** recently organized, has bought foundry and equipment of Chemung Jersey Foundry, Roselle Park, N. J., and will manufacture gray iron and semi-steel castings on a jobbing basis. E. S. Cameron is president; C. H. Keck, vice-president and M. H. Keck, secretary.

**Standard Brands, Inc.,** 595 Madison Avenue, New York, manufacturer of yeast and kindred products and alcohol spirits, will take bids on general contract early in November for group of 19 buildings, one, two and three stories, at Oakland, Cal., for distilling and other service. Cost about $500,000 with equipment. Bliss & Fairweather, Balboa Building, San Francisco, are architects. Pacific coast offices of company are at 245 Eleventh Street, San Francisco.

## WESTERN PENNA.

**Keystone Carbide Co.,** Monongahela, Pa., recently organized by Chicago interests, is closing arrangements for acquisition of former plant of Cyclops Foundry Co., East Main Street, and will remodel for new works to give employment to about 150 men.

**Riedel & Sons Mfg. Co.,** Marion Hill, New Brighton, Pa., manufacturer of brass castings, nickel-plated specialties, etc., plans rebuilding one-story plant, recently destroyed by fire.

**Fesenmeier Brewing Co.,** Huntington, W. Va., M. I. Fesenmeier, head, has let general contract to Frank Weiler, Huntington, for remodeling former local packing plant for brewery. Cost about $150,000 with equipment. Konrad Keil, 1215 Windsor Drive, Dayton, Ohio, is engineer.

**Town Council,** Hurricane, W. Va., plans installation of pumping machinery and auxiliary equipment for new water supply system. Cost about $61,000. Financing is being arranged.

**Joseph S. Finch & Co., Inc.,** Clark Building, Pittsburgh, distiller, has let general contract to Cuthbert Brothers Co., Bessemer Building, for new two-story fermenting and still plant, 66 x 95 ft., as another unit in expansion program recently noted. Cost about $50,000 with equipment. Entire project will cost more than $250,000. Carl J. Kiefer, Schmidt Building, Cincinnati, is engineer.

## BUFFALO DISTRICT

**New York State Electric & Gas Corpn.,** Ithaca, N. Y., plans new power distributing substation and transmission lines near Half Moon, N. Y. Cost about $40,000 with equipment.

**Summit, Inc.,** Geneva, N. Y., has been organized by Willard S. Kidney, 78 North Brook Street, and Earl C. Staley, Waterloo Road, capital $200,000, to manufacture stoves, ranges, parts, etc. It is understood that new company will succeed to Summit Foundry Co., Inc., Middle Street, manufacturer of kindred products.

**Federal Portland Cement Co.,** Hamburg Turnpike, Buffalo, plans early reopening of mill, following shutdown for several months. Improvements will be made in plant and equipment. Albert A. Oesterle, formerly superintendent at mill of Peerless Portland Cement Co., Port Huron, Mich., will be superintendent.

## SOUTHWEST

**Southwestern Brewing Corpn.,** 2 N. W. Third Street, Oklahoma City, Okla., recently organized, has approved plans for extensions and improvements in former brewery, location noted, including new equipment. Cost about $100,000 with machinery. Oscar Faehnle is superintendent.

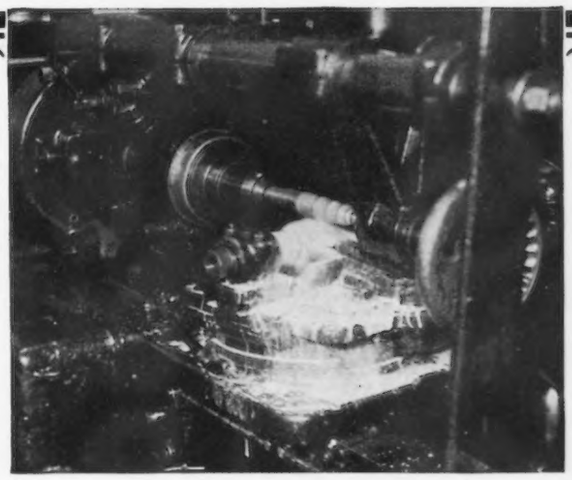
**Common Council,** Norton, Kan., plans installation of pumping machinery, tanks, pipe lines, etc., for new municipal sewage disposal works. Cost $38,500 with equipment. Financing has been arranged.

**Board of Education,** Duncan, Okla., plans manual training department in new multi-story high school and junior college. Cost about $175,000. Bond issue is being arranged. J. B. White, Ardmore, Okla., is architect.

**Board of Public Utilities,** City Hall, Kansas City, Kan., C. A. Lowder, secretary, plans three new booster pumping plants for municipal water system, with elevated steel tanks and other equipment. Cost $112,000. Financing is being arranged.

**Municipal Light Department,** Chanute, Kan., plans extensions and improvements in electric light and power plant, to include new 2500-kw. turbo-generator unit and accessories. Cost about $70,000. E. A. Pierce is superintendent.

**Alkot Petroleum Co.,** Chase, Kan., recently organized by Leo and C. H. Kopp, Oklahoma



**OPERATION:** HOBBING, ROUGH CUT AND FINISH FROM SOLID STOCK. TRANSMISSION HELICAL SPLINE SHAFTS.

**MACHINE:** BARBER-COLMAN GEAR HOBBER.

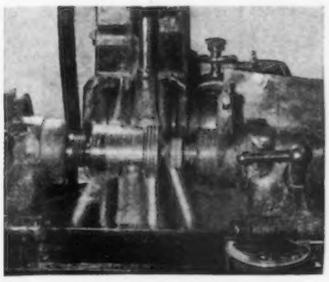
**MATERIAL:** S.A.E. 3115.

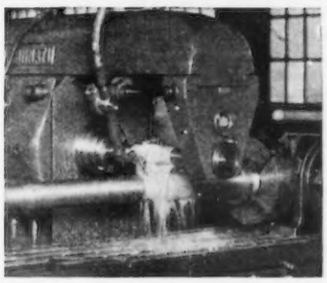
**PRODUCTION:** 8 PIECES PER HOUR.

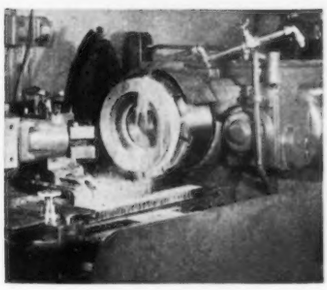
**LENGTH AND DEPTH OF CUT:** 6.25 IN. LONG AND .128 IN. DEEP ON EACH SIDE.

**LUBRICANT:** 1 PART SUNOCO TO 6 PARTS WATER.

*[Courtesy of Canadian Acme Screw & Gear, Ltd., Toronto, Canada]*







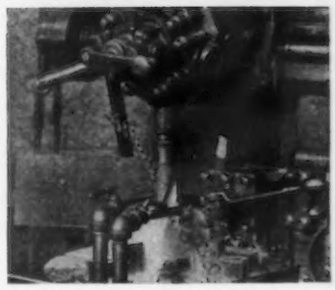
# Fighting the Battle of Speed—Friction Production—Profits

THE battle of speed, friction, production and profits is fought right at the edge of the cutting tool.

And at this point, Sunoco Emulsifying Cutting Oil performs most satisfactorily its task as a cooling and lubricating agent, over the widest range of turning, milling, drilling, grinding and other metal working operations.

Increased production, more perfect work, lower cutting costs and greater profits are direct benefits derived from the use of Sunoco.

A trial in your plant under your own conditions will convince you of its merits.



SUN OIL COMPANY, PHILADELPHIA, PA., U.S.A.

# SUNOCO

EMULSIFYING

# CUTTING OIL

*Made by the producers of* BLUE SUNOCO MOTOR FUEL

Akron, Albany, Allentown, Atlantic City, Baltimore, Battle Creek, Beaumont, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Detroit, Flint, Grand Rapids, Harrisburg, Jackson (Mich.), Jacksonville, Miami, Newark, New York, Philadelphia, Pittsburgh, Providence, Reading, Rochester, Scranton-Wilkes Barre, Syracuse, Tampa, Toledo, Trenton, Wilmington, Youngstown.

*Subsidiary Companies:*

Sun Company . . . Tulsa  Sun Oil Co., Ltd., . . . Montreal and Toronto  British Sun Oil Co., Ltd., . . . London, England.

City, Okla., plans new oil refinery at Chase, also bulk storage and distributing plant. Cost over $90,000 with equipment.

**Common Council,** Jewett, Tex., plans installation of pumping machinery and other equipment for water and sewer system, including pipe lines, valves, etc. Cost about $50,000. D. M. Duller, Second National Bank Building, Dallas, Tex., is consulting engineer.

**Commanding Officer,** Fort Bliss, Tex., has secured appropriation of $1,800,285 for new buildings and equipment, including warehouses, shops, fire station, telephone construction, officers' buildings, etc.

## OHIO AND INDIANA

**Brewing Corpn. of America, Inc.,** Quincy and East Ninety-third Streets, Cleveland, subsidiary of Peerless Motor Car Corpn., has arranged for stock issue of $461,740, part of fund to be used for new brewery on which work is under way. Company will occupy about 100,000 sq. ft. floor space of former motor car works of parent organization and will build addition. Julius C. Schultz, 1370 Main Street, Buffalo, is architect and engineer. Company will be associated with Brewing Corpn. of Canada, Ltd., London, Ont., using patents, etc., of that organization.

**Department of Public Service,** Cleveland, William J. Kennedy, director, let contract to C. O. Bartlett & Snow Co., 6200 Harvard Avenue, for new municipal incinerator plant, 150 x 300 ft. Cost $700,000 with machinery.

**City Council,** Alliance, Ohio, plans new municipal electric light and power plant. Cost $700,000 with equipment. Bond issue will be voted at November general election.

**Contracting Officer,** Material Division, Wright Field, Dayton, Ohio, asks bids until Oct. 31 for bomb release bracket assemblies (Circular 110); until Nov. 1, eight propeller blades, 9 ft. 10 in. diameter (Circular 103), 20 gun mount adapter assemblies, 100 ammunition magazine assemblies, 40 ammunition magazine mount assemblies; until Nov. 7, cable bushings, turnbuckles, clips, pins, cable shackles, etc. (Circular 107), oil temperature adapters, conduit clamps, couplings, flanges, nipples, plugs, tees, etc. (Circular 109).

**Andrew Jurgens Co.,** Spring Grove Avenue and Alfred Street, Cincinnati, manufacturer of soaps, etc., has plans for new power house, to include turbo-generator unit and accessories, boiler to use pulverized fuel, refrigerating and other equipment. Cost over $50,000. A. M. Kinney, Inc., Carew Tower, is consulting engineer.

**Black-Clawson Co.,** Hamilton, Ohio, manufacturer of pulp and paper mill machinery, plans rebuilding pattern shop recently destroyed by fire. Loss over $100,000 with equipment.

**City Council,** Goshen, Ind., is arranging financing for $100,000 for extensions and improvements in municipal electric light and power plant, and city waterworks, to include new equipment. Bemis Co., 105 West Adams Street, Chicago, is engineer.

**Reynolds' Stokers, Inc.,** 127 Claire Avenue, Fort Wayne, Ind., has been organized by Ralph Reynolds and Harold Albersmeyer, to manufacture coal-burning stokers and parts.

## WASHINGTON DISTRICT

**City Council,** Danville, Va., E. C. Brantley, manager, Department of Public Utilities, has secured Federal loan of $2,500,000 for municipal hydroelectric power plant on Dan River, Patrick County, and plans early call for bids. Project will include power dam, generating station, power switching and substations, transmission and distribution lines. Service will be furnished to other communities in same district.

**Commanding Officer,** Fort Humphreys, Va., has secured appropriation of $1,683,787 for new construction and equipment, including quartermaster shops, quartermaster warehouse, engineer warehouse, mechanical shop and automobile garage, magazine, fuel and scale house, board of engineers' equipment, and other structures; also $600,000 for improvements and reconditioning of electrical system, water and sewer system, and other utilities.

**General Purchasing Officer,** Panama Canal, Washington, asks bids until Oct. 31 for steel machine bolts, brass gate valves, hose gate valves, cast iron and malleable iron pipe fittings, screw cast brass pipe fittings, etc. (Schedule 2912).

**City Council,** Williamsburg, Va., plans installation of pumping machinery and other equipment for extensions and improvements in municipal water and sewage system; also new municipal incinerator plant. Cost $223,650 with equipment. Financing is being arranged.

**Bureau of Supplies and Accounts,** Navy Department, Washington, asks bids until Oct. 31 for arc welding sets (Schedule 796).

**Navy Department,** Washington, has secured fund of $255,265 for tools and other equipment for local naval gun factory. Bids will soon be asked by Bureau of Supplies and Accounts. An additional fund of $280,622 has also been authorized for purchase of like equipment for other shore stations in different parts of country.

## SOUTH ATLANTIC

**City Council,** Rocky Mount, N. C., plans installation of pumping machinery and auxiliary equipment, steel water tank, pipe lines, etc., for new water purification plant and system. Cost about $250,000 with equipment. Financing is being arranged. Leslie B. Aycock is city manager.

**R. I. Mintz,** Southport, N. C., is interested in project to erect local oil storage and distributing terminal, and plans purchase of fuel oil storage tanks, cranes, conveying and other equipment.

**Common Council, Parler,** S. C., plans municipal electric transmission line and distributing system, with power substation and switching plant. Cost over $25,000 with equipment.

**Florida Development Co.,** Fort Pierce, Fla., Frank Upton, head, plans new three-story precooling, storage and distributing plant for citrus fruits. Cost about $450,000 with equipment, including power and mechanical draft units, conveying, loading, elevating and other equipment. Financing is being arranged. Charles E. Lund & Associates, Florida Empire Building, St. Petersburg, Fla., are engineers.

## MIDDLE WEST

**Distillers & Brewers Corpn. of America,** Peoria, Ill., recently organized, has acquired local Corning distillery of Allied Mills, Inc., 141 West Jackson Street, Chicago, and will remodel for production of whiskey, gin and other spirits. Cost over $125,000 with equipment. Allied Mills will retain its Atlas distillery at same place, and recently authorized plans for expansion and modernization to cost about $100,000 with machinery.

**Elgin Machine Works, Inc.,** 412 North State Street, Elgin, Ill., has filed plans for two-story addition. Cost about $24,000 with equipment.

**Common Council,** Macon, Ill., plans installation of pumping machinery and auxiliary equipment, pipe lines, etc., for new municipal water supply system. Cost $34,000. Financing has been arranged.

**Abt Art Metal Door & Window Co.,** 2651 West Roosevelt Road, Chicago, has been organized by Louis Abt and associates to manufacture metal sash, doors, etc. Company will be affiliated with Abt Double-Ventilating Skylight Co., same address.

**Common Council,** Glenwood, Minn., has been authorized at special election to arrange bond issue of $140,000 for new municipal electric light and power plant. J. H. Thoreson is city clerk.

**City Council,** Hastings, Neb., plans extensions and improvements in municipal electric light and power plant, including new equipment. A 25-ton overhead traveling crane will be installed. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

**Wells-Abbott-Nieman Co., Inc.,** Schuyler, Neb., plans rebuilding part of flour milling plant and elevator recently destroyed by fire. Loss $350,000 with equipment.

**Board of Education,** Bismarck, N. D., plans manual training department in new multi-story high school. Cost $203,000 with equipment. Bonds have been authorized. Ritterbush Brothers, Bismarck, are architects.

**Firestone Tire & Rubber Co.,** 1013 Walnut Street, Des Moines, Iowa, has plans for new

*Seamless steel case, lacquer finish, produced by G. P. & F.*

# G. P. & F. Stampings Will Help You Stay Within Public Buying Power

OPERATING at a profit without a too drastic increase in prices must be the order of the day. Many manufacturers are turning to G. P. & F. Stampings as the answer to the problem of improving products at lower costs.

You will secure the results of over 50 years' experience when you ask for the help of G. P. & F. Engineers in redesigning your product to use stampings . . . in improving the stampings you may already use.

The booklet *"In Harmony with Modern Progress"* describes many achievements with stampings. Write for your copy.

*Highly finished aluminum case for hair dryer typical of G. P. & F. engineering skill.*

*Perforated steel barrel for electric hammer . . . lighter, uniform . . . produced by G. P. & F.*

Geuder, Paeschke & Frey Co.

*Sales Representatives in Principal Cities in All Parts of the Country*

1415 W. St. Paul Ave., Milwaukee, Wis.
338 W. Ohio St., Chicago, Ill.

G.P.&F. STAMPINGS

NRA MEMBER U.S. WE DO OUR PART

# This forge furnace operator saved

**83%** in time to heat up

**84%** in fuel to heat up

**52%** in fuel per lb. of stock heated, and secured a

**55%** increase in production

To determine the amount of savings effected through the use of B&W Insulating Firebrick, a large operator of industrial furnaces recently conducted a comparative test.

B&W Insulating Firebrick replaced fireclay brick in one of two gas-fired open-slot forge furnaces. Both furnaces were placed in operation, and the accompanying data recorded.

The resultant savings were so substantial that this refractory is now used in practically every furnace in this plant, and the operator is realizing lower furnace operating-costs.

If you, too, are interested in lower operating costs, we suggest that you investigate the many money-saving advantages of B&W Insulating Firebrick. To assist you, we have prepared a bound set of service reports, which will indicate the amount of savings you may secure and the adaptability of this refractory to your particular requirements in your plant.

No obligation, of course. Simply write for Bulletin R-14, addressing The Babcock & Wilcox Company, 85 Liberty Street, New York, N. Y.

The following test results were recorded during production runs of two forge furnaces of equal size, one lined with B&W Insulating Firebrick, the other with fireclay brick. These results were so startling and the savings so substantial that the officials repeated the test to check its accuracy, but only to find that each succeeding one equalled or bettered these results!

## COMPARATIVE OPERATING DATA

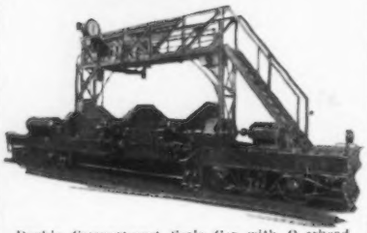
| | Firebrick | B&W IFB |
|---|---|---|
| Time from lighting until ready for work in minutes | 60 | 10 |
| Fuel consumed during this period in cu. ft. | 1250 | 200 |
| Fuel consumed during 9 hour cycle in cu. ft. | 11,355 | 8,894 |
| Lb. of work per sq. ft. of hearth | 53.7 | 83.4 |
| Fuel per lb. of work, including heating-up in cu. ft. | 7.5 | 3.57 |
| Total weight of stock heated in lb. | 1610 | 2496 |

# BABCOCK & WILCOX

*Babcock & Wilcox Insulating Firebrick*

B-21

ATLAS CARS



Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.

20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

Atlas Products

Gas-Electric and Diesel-Electric Locomotives

Electric Transfer Cars for Blast Furnaces and Steel Plants

Stockhouse Scale Cars for Blast Furnaces

Concentrate and Calcine Cars for Copper Refineries

Automatic and Remote Controlled Electric Cars

Pushers, Levellers and Door Extractors

Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose.

**THE ATLAS CAR & MFG. CO.**

*Engineers - Manufacturers*

**1140 Ivanhoe Rd., Cleveland, O.**


two-story and basement factory branch, storage and distributing plant, 100 x 100 ft. Cost about $75,000 with equipment. Proudfoot, Rawson, Borg & Brooks, Hubbell Building, are architects.

**United Brewing Co.**, Gilmer, Ill., will take bids soon for extensions and improvements, including two-story and one and one-half story additions. Cost over $75,000 with equipment. Herman J. Gaul, 288 East Superior Street, Chicago, is architect.

**Common Council**, Elk Point, S. D., plans about 20 miles of new power transmission lines for service in rural districts. Cost $25,000. Bond issue has been authorized. Buell & Winter, Insurance Exchange Building, Sioux City, Iowa, are consulting engineers.

**Mueller Co.**, Decatur, Ill., manufacturer of brass and iron plumbing, water and gas valves, is erecting $250,000 plant in Hostetter industrial district of Los Angeles. New factory is expected to be ready for production about Dec. 1 and will serve Pacific southwest, Hawaiian and Oriental trades.

**Hamburg Brewing Co.**, Wonewoc, Wis., has been incorporated by C. E. Hamburg, W. W. Peters and C. C. Matthews to build new brewery. Cost about $135,000. Urban F. Peacock, 719 North Thirty-second Street, Milwaukee, is architect. Requirements include power plant equipment, ice machine, 36 200-bbl. steel storage tanks, etc.

**National Pressure Cooker Co.**, 1515 Ball Street, Eau Claire, Wis., has plans by Carl Volkman, local architect, for factory addition, 32 x 110 ft.

**City Council**, Beaver Dam, Wis., has applied for Federal aid in sum of $100,000 for new sewage disposal plant, designed by Jerry Donohue Engineering Co., Sheboygan, Wis. William A. Gergen is city clerk.

**Sparta Machinery & Pump Co.**, Sparta, Wis., has been incorporated with $20,000 capital stock by W. R. Crosby, O. J. Gustad and L. E. Austin to manufacture equipment especially adapted to farm use. Production plans have not been completed.

## SOUTH CENTRAL

**J. T. S. Brown's Sons Distillery Co.**, Bardstown, Ky., Creel Brown, president, plans new works, with storage and distributing plant, power house, machine shop and other structures. Cost over $200,000 with equipment. Joseph & Joseph, Breslin Building, Louisville, are architects.

**Sewerage and Water Board**, New Orleans, asks bids until Dec. 8 for materials and equipment for extensions and improvements in waterworks, sewage and drainage plants and system during 1934. A. G. Moffat, 526 Carondelet Street, is secretary.

**Frankford Distillery Co.**, Dixie Highway, Louisville, is asking bids on general contract for extensions and improvements, including several new units and installation of equipment. Cost over $70,000 with machinery. General contract has been let to Hays & Nicoulin, Louisville, for one-story fermenting plant, 54 x 180 ft. Cost more than $50,000 with equipment. Carl J. Epping, Shelby Street and Broadway, is architect.

**United States Coast Guard Headquarters**, Washington, plans early call for bids for hangar, repair and reconditioning shop at proposed new air base, Biloxi, Miss. Appropriation of $290,000 was recently granted.

**Tennessee Valley Authority**, Muscle Shoals, Ala., David E. Lilienthal, director in charge of power program, has asked bids (no closing date stated) for 675 miles of copper cable and auxiliary equipment for new steel tower transmission line from Muscle Shoals power station to site of new Norris Dam, Clinch River, near Knoxville, Tenn., about 226 miles. A second line between these two points will be built later over another route. Government has authorized fund of $35,000,000 for entire hydroelectric power project. Lewellyn Evans, Muscle Shoals, is consulting electrical engineer.

## MICHIGAN DISTRICT

**Brannon Appliance Corpn.**, Howell, Mich., recently organized by Herbert E. Brannon and Edwin J. Kemp, has taken over local factory and will remodel for manufacture of mechanical and electrical household appliances and equipment. Mr. Brannon will be president and general manager.

**LaSalle Wines & Champagnes, Inc.**, Detroit, recently organized, care of Robert J. Wojcinski, 2297 East Forest Street, vice-president and representative, has acquired property at Farmington, Mich., for manufacture of wines and liquors. Company is also acquiring plant of Windsor, Co., Ltd., Walkerville, Ont., manufacturer of similar products for branch winery. Approval has been secured to dispose of stock issue of $425,000, considerable part of proceeds to be used for purpose noted. Maurice R. Twomey is president.

**Universal Brass Products Co.**, 13440 Klinger Avenue, Detroit, has been organized by Walter Bettinger, 2472 Riopelle Street, and associates, to manufacture brass and other metal specialties.

**Continental Malt Co.**, Detroit, Martin E. Galvin, Commonwealth Commercial State Bank Building, head, recently organized, has engaged G. A. Mueller, 1346 Broadway, architect, to draw plans for new malt plant and power house. Cost about $100,000 with equipment.

**Fafnyr Forge Corpn.**, Albion, Mich., recently organized, has taken over former local hub manufacturing works of Kelsey-Hayes Wheel Corpn., and will soon begin operations for production of metal stampings and forgings. Property was purchased for $75,000. A. J. Preining is president and general manager.

## PACIFIC COAST

**Bonanza Concentrator Co.**, 1438 Beechwood Drive, Los Angeles, recently organized to manufacture concentrating machinery for mining, parts, etc., plans new one-story plant at Pico Boulevard and Soto Street, about 30,000 sq. ft. floor space. Cost $50,000 with equipment. Zuckerman & Horwitz, 10 North Clark Street, Chicago, are architects.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until Oct. 31 for one motor-driven straight line cut-off saw (Schedule 895), 500 metallic ladder treads, aluminum alloy (Schedule 872), 30 electric searchlights and spare parts (Schedule 883) for Mare Island Navy Yard.

**Commanding Officer**, March Field, Cal., has secured appropriation of $214,012 for new buildings and equipment, including well tank and pumping equipment, ordnance warehouse, radio building, gasoline storage system, aircraft bomb storage system and other structures.

**Board of City Trustees**, Montebello, Cal., is arranging financing for $400,000 for new municipal electric light and power plant, using Diesel engine-generating units and accessories, power substation and transmission system.

**Public Works Department of City Commission**, Portland, plans six electric-operated pumping plants to cost $1,008,000 with equipment, for new municipal sewage disposal plant, for which bond issue of $6,000,000 has been authorized. O. Laurgaard is city engineer. Metcalf & Eddy, Statler Building, Boston, Mass., are consulting engineers.

**Horluck Brewing Co.**, 602 Westlake Street North, Seattle, has taken out permit to build new one-story bottling works, 66 x 93 ft. Richard Ullrich, Smith Tower, is engineer.

**Bureau of Reclamation**, Denver, asks bids until Nov. 1 for pumping machinery and electrical equipment for new unit No. 2, south side pumping station No. 3, Minidoka project, Idaho (Specification 602-D).

**State Highway Department**, Sacramento, has let general contract to Leo Epp, 4745 Geary Street, San Francisco, for one-story addition to headquarters mechanical shop, Sacramento. Cost over $26,000 with equipment.

**L. B. Dapron**, 232 East Seventh Street, Hanford, Cal., is at head of project to build a new plant at Dudley Ridge, near city, for production of carbon black, gas products, etc. Cost over $100,000 with compressor plant, natural gas pipe lines and regulator station, and other units.

## FOREIGN

**South Manchuria Railway Co.**, Dairen, Manchuria, is arranging appropriation of 60,000,000 yen (about $16,500,000) for extensions and improvements and new projects during next fiscal year. Considerable part of fund will be used for erection of Rashin Showa Steel Works, Mukden, Manchuria, an affiliated organization, and for new railway lines, with locomotive and car repair shops, and other operating structures.

**Imperio Oil Co.**, Tampico, State of Tamaulipas, Mexico, plans rebuilding part of oil refinery recently damaged by hurricane. Loss over $150,000 with equipment.

**Director, Posts and Telegraph Department**, Melbourne, Australia, asks bids until Nov. 28 for cable for telephone service.

# The "COMBINATION SYSTEM" for SHEET AND TIN PLATE PRODUCERS

TRADE MARK

*Photo Courtesy Allegheny Steel Co.*

The continuous heating furnaces and mechanical equipment for sheet or tin mills included in The Combination System are covered by one or more of the following patents: Nos. 1871102, 1824001, 1779964, 1767574, 1760762, 1750534, 1746488, 1730739, 1702739. Licenses to operate under all of these patents and other patents pending can be furnished *mills* by The Wean Engineering Company, Incorporated.

**Labor must be aided by efficient equipment if it is to produce sheet steel or tin plate at a price that will promote sales in sufficient volume.**

**The "Combination System" aids labor to turn out greater production with less physical strain. The operating cost of the "Combination System" involving the use of Continuous Furnaces and Automatic Feeding and Catching Tables is competitive with any other flat rolling method.**

WHY?

## *Because It's Labor-Aiding!*

**THE WEAN ENGINEERING CO., Inc. • • • Warren, Ohio**

FLINN & DREFFEIN CO. • *Associated Companies* • THE McKAY MACHINE CO.

## Cold Heading Symposium At Cleveland A. S. S. T.

A COLD heading symposium was held by the Cleveland Chapter of the American Society for Steel Treating at the first meeting of the season, Oct. 9. The various manufacturing processes in making bolts and screws were described in a talk by Carl L. Harvey, metallurgist, Lamson & Sessions Co., Kent, Ohio, the subject being "Wire Drawing, Wire Finishing, Dies and Die Steel and Mechanics of Cold Heading." While wire with a carbon content of 0.30 to 0.40 per cent was formerly commonly used, he said there has been increasing demand for steel with a low alloy content.

Recently the pickling process has been given a good deal of attention and the temperature and acid are being controlled, resulting in an improved product and economies in manufacture. Use of proper types of coatings had also helped to improve the product. While his company had used inhibitors for test periods their experience had indicated that their use was not justified, as it did not result in a saving. However, he said that when finish is important the use of inhibitors will result in a saving.

Trouble due to the wearing of wire drawing dies he said has been eliminated by the use of carbide dies, and die life has been prolonged. Over 500,000 feet of wire have been drawn in one carbide die.

The speaker listed various production troubles experienced in the manufacture of cold headed bolts and screws, among them improper set-up, poor steel, improper coatings, hard wire, poor service conditions and poor heading dies. While wire used is usually under 190 Brinell hardness, harder wire may be upset if desired. The stock should be as free from surface flaws as possible. He recommended the use of the twist test to show seams. He said that in his company's plant steel with a carbon content of 0.90 to 1.00 is being used in making dies and is heat treated at high temperature and quenched to secure a deep case. In carburizing high chrome high speed steel for threading dies he said that he had found gas coke a very good packing material for use in case artificial atmosphere is not available. Better results are obtained, he stated, with a long draw at low temperature than a shorter draw at higher temperature.

Cold heading materials and their microstructure was the subject of a talk by Harry P. Pulsifer, metallurgist, Ferry Cap & Set Screw Co., Cleveland. He showed numerous photomicrographs of steel, copper, bronze and Monel metal used in making cold headed bolts and screws.

## British Steel Output Up 20 Per Cent in September

LONDON, ENGLAND, Oct. 20 (*By Cable*).—Steel ingot production in the United Kingdom made a sharp upward spurt in September, gaining about 20 per cent over the preceding month of August. The total tonnage of ingots produced was 669,000, representing an increase of 117,700 tons.

Pig iron production fell off slightly, the output for September being 359,700 tons in comparison with 362,700 produced during August.

Monthly totals for 1932 and for the first nine months of this year are shown below:

| | Pig Iron | Steel Ingots |
|---|---|---|
| 1932 | | |
| Jan. | 332,400 | 429,700 |
| Feb. | 318,100 | 480,600 |
| March | 335,600 | 462,800 |
| April | 316,900 | 433,300 |
| May | 315,300 | 416,900 |
| June | 311,400 | 459,300 |
| July | 292,600 | 430,300 |
| Aug. | 259,400 | 361,500 |
| Sept. | 260,400 | 430,300 |
| Oct. | 275,600 | 438,500 |
| Nov. | 267,700 | 473,800 |
| Dec. | 284,500 | 430,400 |
| | 3,569,900 | 5,247,400 |
| 1933 | | |
| Jan. | 286,600 | 444,400 |
| Feb. | 270,800 | 482,700 |
| March | 332,200 | 577,700 |
| April | 324,700 | 513,300 |
| May | 339,900 | 599,600 |
| June | 345,600 | 568,800 |
| July | 343,900 | 567,500 |
| Aug. | 362,700 | 551,300 |
| Sept. | 359,700 | 669,000 |

## Streamline Passenger Coach Has Chrome-Molybdenum Tubing Frame and Aluminum Sheathing

THE latest form of railroad passenger equipment, known officially as the "railplane," will soon be ready for tests. The car body without inside trim, seats, etc., weighs only 5000 lb. though it is 60 ft. long and has a seating capacity of 50 persons. The total weight is 25,000 lb., including two engines, which are designed to drive the car at 90 miles an hour. The car is fully streamlined, even the steps folding into the car body to reduce air resistance.

Framework of the car body is made of chrome-molybdenum steel tubing members welded in place. Truck frames are also constructed of chrome-molybdenum tubing combined with a few steel castings which are essentially tie-members and are not subjected to high stresses. The side and roofing sheets are made of aluminum alloy. Resilient wheels are used, with rubber acting in sheer and brakes are of the automotive drum type.

One engine drives the front axle and the other drives the rear axle of the same truck, all mechanism under the control of the one operator. Gears are shifted automatically and one throttle controls both engines, either of which may be operated separately. The car has been constructed for the Pullman Car & Mfg. Corporation by the Stout Engineering Laboratories, Inc., Dearborn, Mich.

# STAINLESS STEEL

**where you need it to resist corrosion**

# CARBON STEEL

**for strength and economy**

# USS PLYKROME

*Logical isnt it?*

IT was inevitable that engineering skill would develop an economical way to utilize the corrosion resistant qualities of Stainless Steel.

But it was not until the development of Plykrome that users could be sure of a stainless-clad plate that was proof against splitting or separation of the plies, and that was not affected by the production processes.

Plykrome is unique because of its use of a bond sheet between the stainless steel veneer and the carbon steel base. This assures a perfect bond and excludes all carbon from the stainless steel. Hence its corrosion resistance is precisely that of solid stainless steel.

Write us today for information and suggestions on the application of Plykrome to your needs.

## Illinois Steel Company

208 SOUTH LA SALLE ST. CHICAGO, ILLINOIS

SEE STEEL MAKING IN OUR EXHIBIT AT (ENTURY of PROGRE)

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

USS CHROMIUM-NICKEL ALLOY STEELS ARE PRODUCED UNDER LICENSES OF THE CHEMICAL FOUNDATION, INC., NEW YORK, AND FRIED. KRUPP A. G. OF GERMANY

# JUST BETWEEN US TWO

## Tragedy in Seven Words

A LETTER we sent recently to the head of a Midwestern structural steel firm was returned by the local bank, marked:

"The bridge works closed. B. killed himself."

## Gum Drops and Castings

WHEN the A.B.C. auditor was here a few weeks ago he said there was a fire insurance firm in Milwaukee named Byrnes & Byrnes. Maybe he was kidding us, but in checking Dun's, to find the holes in our prospect list, we do find that W. C. Booz is a malt and hops dealer in Baltimore.

We thought it funny, too, that Carl Mueller of Fort Wayne, Ind., should run a combination machine shop and dry cleaning establishment. No doubt the first keeps the second busy. Harold W. Bentham of Baltimore gives his business as "tools and sea food," and then there's that Midwestern establishment that runs a combination foundry and confectionery store.

## Not Bad, Not Bad

HOW fared our subscription renewal percentage, we wondered, during the pre-Gen. Johnson days of January to April, 1933, when banks and plants were folding up like Phil Baker's accordion during an allegro movement?

We totaled up the subscriptions that expired during that depression nadir. Just 4177. The A.B.C. allows us six months in which to get paid renewals. Trepidly we added them up. Hooray! Hooray! We beat the three thousand mark! Exactly 3002.

Of the recalcitrant 1175, some went out of business, died, or just plain up and left us flat. But 72 per cent, or better than 7 out of every 10, renewed.

A 72 percentage of renewals even in good times is something for which many a publisher would swap his font of brand new Girder.

## Watch the Birdie, Mr. Morgan

IN running over the renewals we noticed one from J. P. Morgan & Co., which made us think that if we were as good a publicity man as some circus people we could get a picture of Mr. Morgan holding The Iron Age on his lap. Then if we were trying to sell a little advertising to the Economy Tool & Die Company, Greenbush, Minn. (rated L3½, $1,000 to $2,000 Fair), we could say,

> *"Of course, the primary purpose of this advertising is to help you sell more tools and dies, but consider, Mr. Finkel, the secondary value! You may some time want to float a bond issue for purposes of expansion—and—(then we would flash the picture of Mr. Morgan reading The Iron Age)—need we say more?"*

## It Might Have Been "Ballyhoo"

BUT we are a little afraid of that kind of a proposition ever since our dismal experience with Mr. Ford's picture. It seems that Henry Ford, head of a well-known automobile company, had his picture taken, holding a copy of The Iron Age.

It happened to be a very fine picture, esteemed so highly by Mr. Ford that he used it, and perhaps still does, as the frontispiece of the booklet given to visitors at the Ford plant.

Naturally, we were elated. Here, we said, is visual proof that The Iron Age is beloved by the father of all Fords. We implied as much to a man high up in Ford councils. He told us, "Mr. Ford wanted to be photographed holding a copy of a magazine. He picked yours just because it happened to be handy."

So we bought a Chevvy.

—A. H. D.

# "I have been retired

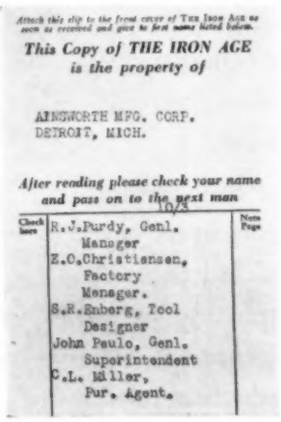
by the ..... Company*, after thirty years as operating manager," writes an Iron Age subscriber.

*(*A gigantic firm building an article of light machinery, sold all over the world.)*

"I am indeed sorry to have to drop my subscription to the 'Age,' after over 43 years continuous reading.

"There are three people in my office at the Factory who read the 'Age,' *but they can now have their names put on the circulating list in the Factory, and by so doing will still see the 'Age' every week.*"

The Iron Age furnishes factory routing forms *free of charge.* Our apologies to the Ainsworth Manufacturing Co. for taking the liberty of reproducing here the routing form recently supplied to them.



*Attach this slip to the front cover of* THE IRON AGE *as soon as received and pass to first name listed below.*

*This Copy of THE IRON AGE is the property of*

AINSWORTH MFG. CORP.
DETROIT, MICH.

*After reading please check your name and pass on to the next man*

10/3

| Check here | | Note Page |
|---|---|---|
| | R.J.Purdy, Genl. Manager | |
| | E.C.Christiansen, Factory Manager. | |
| | S.E.Enberg, Tool Designer | |
| | John Paulo, Genl. Superintendent | |
| | C.L. Miller, Pur. Agent. | |

The slips are a handy size, 2¾" x 5½". As they are gummed, you can attach one in an instant to The Iron Age when it comes in each week.

Fill in on the blank below the names of Iron Age readers in your organization and you will receive *without charge and without any obligation* a year's supply of the slips. When you need more, we'll send them, *no charge.*

To THE IRON AGE, 239 W. 39th St., New York

***Send gratis a year's supply of routing forms bearing the following names:***

PRESIDENT.....

VICE-PRES.....

GENERAL MANAGER.....

WORKS MANAGER.....

PURCHASING AGENT.....

METALLURGIST.....

.....

.....

*Indicate by numerals—1, 2, 3, etc.—the order in which the names are to be arranged on the routing forms.)*

COMPANY.....

ADDRESS.....

.....